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# *Oxy-steel Age*

STEELMAKING with the help of gaseous oxygen is now recognized the world over as a highly productive and economic process. This is made clear in relation to the United Kingdom in an article in the latest issue of Steel Review, published by the British Iron and Steel Federation. Referring to the impact of oxygen on steelmaking plans the article states that the development, now being executed or in preparation will so alter the pattern of steelmaking in the United Kingdom that the open-hearth process, which has for many years been responsible for some 85 per cent. of our production, will in 1965 account for only 70 per cent. of our steelmaking effort. By that time some 13 per cent. of capacity will be represented by the LD and Kaldo oxygen steelmaking processes.

Similar revolutionary changes in steelmaking have taken place throughout the world. As would be expected, the greatest change has been on the Continent of Europe, where the oxygen processes were developed with such remarkable ingenuity in the post-war period.

Looking back (it is so easy to be wise after the event), it would appear that the inventiveness of the European steelmakers arose in response to a need to make sheet steel of extra-deep drawing quality for the automobile and other sheet fabricating industries. The basis of steel production on the Continent had long been the Thomas process, which, so far as the production of low nitrogen extra-deep drawing quality steel is concerned, is inferior to the open-hearth process.

With the advent of the mass production of steel sheet in the modern strip mill, the continental steelmakers had either to change to the open-hearth process or find some way of radically improving converter steel in respect to nitrogen content. They were not slow to take advantage of the fact that the production of oxygen in bulk—now known as " tonnage " oxygen—was fast becoming economically possible.

At first, substitution of some of the air by oxygen in the conventional bottom-blowing process was tried. Blowing with air enriched to 30 to 35 per cent. oxygen was found practicable and a useful reduction in the nitrogen content of the steel resulted, but not to as low a value as desired. To cut a long story short, Austrian steelmakers brought the pure oxygen top-blowing process—the renowned LD process—into production in 1952, and in the following three or four years the now well-known Kaldo, Rotor, and steam-oxygen processes became practical economic realities.

The subsequent useful modification to these processes are too numerous to detail here. It is sufficient to record that the continental steelmakers succeeded in providing a number of alternative processes suited to varied raw material conditions for making steel of much lower nitrogen content than open-hearth steel and equal or superior to it in its deep drawing qualities. The building of tonnage oxygen plants for oxy-steelmaking units took place overnight, so to speak, on the Continent, and steelmaking capacity in Japan, Canada, and America installed before the end of the 1950s took the form of the new LD process.

The UK steel industry, to put it mildly, was over-cautious in its approach to oxygen steelmaking. Admittedly, the new processes were not "tailor made" to British steelmaking conditions, but it is nevertheless surprising that apart from a few enthusiasts—the late Oscar Brandt was a notable example—there was little inclination to experiment with and adapt new methods to our conditions. Presumably our industry could not wrench itself from its traditional open-hearth process, by which it was meeting quite adequately the increasing demand for extra-deep drawing sheet metal.

The position today is that the British steel industry, as if aware of its initial apathy in using oxygen, has effected a revolution in its pattern of steelmaking in a remarkably short time. In this country there are now three basic Bessemer plants operating on tonnage oxygen, an LD converter is producing steel at Ebbw Vale, LD converters are to be installed by the Consett Iron Company, by Colvilles, and by Richard Thomas & Baldwins at its new Llanwern works. Consett is also installing a Kaldo steelmaking unit.

Further evidence of this revolution, if any is needed, is provided by the figures given in Steel Review for tonnage oxygen production in Britain. The first steelworks tonnage oxygen unit was one of 100 tons per day capacity installed by the Consett Iron Company in 1957 for use as an aid to combustion in the open-hearth process. Then a plant was commissioned by the Brymbo Steelworks as a natural sequel to its pioneer work on oxygen pre-refining. Today, according to Steel Review, the steel industry has eight high-purity oxygen plants in operation with a daily capacity totalling 1,125 tons. Orders have been placed for additional plants with a capacity of 1,775 tons per day of high-purity oxygen and 630 tons per day of 90 per cent. purity oxygen, all of which are expected to be in operation by the middle of 1962. The 90 per cent. purity oxygen plant is for use in three blast furnaces of the Steel Company of

Wales. Other companies, too, are planning to increase their blast-furnace productivity by use of an oxygen-enriched blast. Hence one can reasonably forecast that by the mid 1960s the total oxygen consumption of the steel industry for all purposes will rise to 5,000 tons per day or 1,800,000 tons per year.

What of our large investment—much of it in recent years—in the open-hearth process? The picture here is brighter than one dared to hope some two or three years ago, when the phenomenally high production rates of the LD process became fully realized. Experimenters, notably in this country, have demonstrated that by harnessing oxygen as an aid to combustion and refining in the open-hearth process, fuel costs can be reduced significantly and production rates increased enormously. An outstanding example in Britain at the present time is the use of up to 1,500 cu. ft. of oxygen per ton of steel in the Ajax furnaces at Appleby-Frodingham, which has doubled production rate and reduced fuel consumption to one fifth of its former level. In America, the Ford Motor Company has recently obtained outputs of 100 tons per hour from 200-ton open-hearth furnaces using an "oxy-fuel" lance with an oxygen capacity of 50,000 cu. ft./hr.

An interesting tailpiece to this dissertation on "oxy-steel," is provided by an article in the August issue of Steel, referred to on p. 959. "It pays to have basic oxygen if you are in the steel-making business," the article states. "While the national steel operating rate of the United States has been going downhill, dipping as low as 50 per cent. of capacity in July, oxygen converters have been running above 80 per cent. of capacity in the whole of the year with the exception of February."

## Manufacturing Agreements by Vickers-Armstrongs

SINCE 1946, Vickers-Armstrongs (Engineers), Limited, has been manufacturing large mechanical and hydraulic presses at its Newcastle works to the designs of the "Clearing" division of the United States Industries. Under an extension to this agreement, just concluded, the company's Crayford works is to manufacture a range of "Clearing" open-backed inclinable Torc Pac presses of 22-ton, 32-ton, and 45-ton capacity. The sale in the UK of "Clearing" presses manufactured by Vickers-Armstrongs (Engineers), is handled by the Rockwell Machine Tool Company, Limited, London, N.W.2.

Vickers-Armstrongs (Engineers) has also concluded an agreement with Johann Weiss GmbH, of Berlin, under which the Crayford works will manufacture the Johann Weiss range of high-speed bottle-labelling machines. This will enable a Weiss labelling machine to be offered with the company's range of "Worssam" beer and soft-drink bottling machines.

## *Passing Thoughts . . .*

AN uneconomic newspaper, like an uneconomic pit, must close: that is inevitable. But journalists, or miners, or motor-car workers, or cotton weavers—the individuals who earn the daily bread of industry—are rarely in a position to control their own economic destinies . . . All the working capital that most people possess is put into their jobs. Industries that use it have a responsibility for trying to safeguard it and every industry should have agreed arrangements for meeting this responsibility.—The Guardian.

*A large and expensive expansion in the steel industry is a necessary condition of industrial growth. The process is somewhat easier now that the threat of nationalization has been banished for a long time, perhaps for ever.—The Scotsman.*

It would be a good idea if British Embassies and consular offices oversea were reinforced, from time to time, by marketing directors from industry. There are many sales or marketing directors on the point of retirement who still have several years of useful life which could be devoted to the service of their country . . . their knowledge and experience of particular markets is unrivalled.—MR. W. R. BOWDEN, chairman of the Incorporated Sales Managers' Association.

*Westminster is one of the platforms for much free advice to industry, but in the main encouragement is not in practical terms.—MR. J. B. WOODESON, chairman of Clarke, Chapman & Company, Limited, in his presidential address to the North East Coast Institution of Engineers and Shipbuilders.*

The industrial designer is the custodian of standards, the translator and interpreter of technology, the creator of markets, the protector of the consumer: in short, he is a bridge between invention and consumption and is often himself, the innovator.—MR. PAUL REILLER, director of the Council of Industrial Design.

*You can have a notice the whole length of a factory wall saying: "Don't run in the factory"—and somebody will run. But put up a bit of paper an inch long and an eighth of an inch wide saying: "Don't come to work on Thursday—the company will pay you" and I'll guarantee that there won't be a soul there on Thursday—MR. J. CLIFFORD, industrial safety officer, speaking to Midland factory supervisors.*

I thought when nationalization came in, consideration would be given to those in lower paid jobs. But while under private enterprise one could take one's trouble to the boss and thrash it out with him now there seems to be a boss to every few workmen.—Pit surface worker's wife in a letter to the Western Mail.

## UK Company to Sell Swiss Bearings

RECENTLY formed SRO Bearing Company (Sales), Limited, has opened premises at 164 Camberwell Road, London, S.E.5. The company is the UK sales organization of the Swiss SRO Ball Bearing Works Schmid-Roost, Limited, which operates one of the largest bearing manufacturing plants in Switzerland.

Mr. J. Brand has been appointed manager of the new company.

# *Plan for Coal*

## MR. ROBENS TALKS TO PRESS CONFERENCE

THE National Coal Board's chairman-designate, Mr. Alfred Robens, has his own plans to compete with oil and natural gas, but, he said, at a Press conference at Cardiff on Tuesday, "I don't intend to let the oil boys know what they are at the moment." He stressed the danger of relying on imported oil and natural gas for more than one third of the country's energy needs and added: "With the NCB supplying two thirds of the indigenous fuel we could overcome any difficulties in the Middle East or any interference with tankers coming into this country.

"We do not have to seek the permission of any foreign Government to mine coal, and they cannot interfere with transporting it. What is vitally important at this moment is that the coal industry makes no demands on our balance of payments," he said.

Mr. Robens, who was speaking at the end of a two-day fact-finding visit to the South-Western Divisional Coal Board's Cardiff headquarters, re-emphasized his opinion that the production and sale of 200,000,000 tons of coal a year was the right assessment of the market.

### "Go in Fighting"

To achieve that target would not be easy, but he was developing in his mind ideas and possibilities which might enable the board to reach the target economically. He did not entirely rule out Government aid for the industry, but said he was not taking the view at this stage that the industry would have to have Government subsidies in order to do its job. "I hope we shall so organize the industry that the need for subsidies will not be there at all," he said.

If they could say their objective was 200,000,000 tons, engineers and those responsible for administration knew exactly where to go and it would give security to those employed in the industry. Employees would share in the improved efficiency and prosperity of the industry with better rewards for the jobs they were doing.

The "back-room boys" of the coal industry were engaged in projects which could give coal a "new look." With the advent of packaged, patent fuel, it could well be that the householder would receive coal in an almost unrecognizable form. "If you live close to a coalfield where you get the type of coal you like, you will go on buying it," Mr. Robens said. "But in many other parts of the country you will probably prefer to have a first-class manufactured boiler fuel. Many customers would welcome a new "packet fuel."

Economies totalling £50,000,000 had been made in the past three years, but if they now sat back and allowed other people to steal their markets they were asking for trouble. His answer was "to go in fighting to hold on to customers."

Mr. Robens, accompanied by Mr. David M. Rees, chairman of the South-Western Divisional Coal Board, had an informal meeting with several South Wales miners' leaders. At the conference later Mr. Robens repeated his assurances that he believed in decentralization when it improved the efficiency and prosperity of the industry and ensured security of employment. After he had consulted the chairmen of all the divisions he would decide how much decentralization of organization was needed and in what way.

He did not believe in district wage rates or scientific research and marketing carried out entirely in the divisions. He would keep them under central control: but he did not believe that the structure of the board's organization once designed to produce coal at any price would necessarily be the correct structure for the future.

## Your Grandchildren Will Want Coal, Says Mr. Crawford

"DON'T be sidetracked by talk of atomic power," said Mr. James Crawford, industrial relations member of the National Coal Board, when he addressed men and boys of the No. 6 Area training centre, East Midlands Divisional Coal Board, at Hucknall (Notts) on Tuesday. He continued: "Many years ago it was thought that by 1970 atomic power would mean the nation would need 40,000,000 tons of coal a year less. But the progress has not been as fast as expected and coal will be needed for as long as you live, as long as your children live, and as long as your children's children live."

Mr. Crawford said that the coal industry offered them a rewarding life of great adventure, "especially here, in the East Midlands, the 'powerhouse' of the country."

## Scaffolding Might Have Saved a Life

FALL of rock which killed a miner at Ifton Colliery (Denbighshire) might have been averted if the two miners working the face had used scaffolding to raise themselves off the floor and had drilled a horizontal hole for shotfiring rather than a vertical one. This was stated by Dr. W. B. A. Lewis, the coroner, at an inquest at Oswestry on Mr. Thomas Edward Pennell (42) who was killed in the fall. The jury returned a verdict of Accidental Death.

Mr. Harold Jackson (29), who was working with Mr. Pennell when the accident happened, said that he had tested the face and roof for loose rocks and had then removed the temporary supports so that they could "bore in comfort." After they had bored about an inch vertically into the rock the fall occurred.

FIRTH BROWN TOOLS, LIMITED—Following the resignation of Mr. T. A. Wright, Mr. L. R. Turner is to join the board.

*Personal*

# Italy Honours British Scientists

THIS year's president of the Institution of Nuclear Engineers, Sir JOHN DUNCANSON, has been awarded the gold medal Scientia et Divulgatio of Rassegna Internazionale Elettronica Nucleare e Teleradiocinematografica, Rome, for outstanding merit in the field of nuclear engineering.

SIR JOHN DUNCANSON

Sir John, who is the first president of INE, is chairman of the Rhodesian Iron & Steel Company, Limited, and Metropole Industries, Limited, and a director of a number of companies, including the Lancashire Steel Corporation, Limited, Rylands Bros., Limited, Armco, Limited, and Grampian Shipyards, Limited. From 1942 to 1945 he was Controller of Iron and Steel and he is vice-chairman and a member of the council of the Iron and Steel Institute.

Another British gold medallist is Dr. C. F. BAREFORD, managing director of Vickers Research, Limited.

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Ald. H. A. BENNIE GRAY, who has received the freedom of the Borough of Huddersfield is a former director of W. C. Holmes & Company, Limited, engineers, etc., of Turnbridge, Huddersfield.

Retiring from full-time employment at the end of this month is Mr. T. A. ATKINSON, founder and managing director of Dynamo & Motor Repairs, Limited, a member of the Metal Industries, Limited, group. He will remain as consultant for a time.

Institution of Plant Engineers has elected Mr. GODFREY DAVID JORDAN to be its next president. He is project secretary of the £10,000,000 electric melting shop scheme of Steel, Peech & Tozer branch of the United Steel Companies, Limited.

On completion of 50 years' service with Joseph Rhodes & Sons, Limited, manufacturers of sheet metal working machinery of Wakefield (Yorks), Mr. HARRY RIDGEWAY, the joint managing director, received a presentation at a dinner in his honour.

Five-man trade mission to Hungary, headed by Mr. ROBERT WILLS ASQUITH, chairman of the Asquith Machine Tool Corporation, Limited, Halifax, left last Friday. The visit will include talks with Hungarian ministries and State trading representatives.

Mr. ALLEN J. COLEM..N (22) has been awarded the first prize in the student apprenticeship class of the Engineering Industries Association Group Apprenticeship Competition for 1960, for his paper on "A Random Observation Work Study." He is the son of Mr. John P. Coleman, chairman of the Gresham Lion Group, Limited, Hanworth (Middx), which includes Gresham Transformers, Limited, and Gresham Automation, Limited. He was one of the founders and originators of Engineering Industries Association Group Apprenticeship Scheme in 1953.

# *AEI Secures Orders for Pit Winders*

REPLACEMENT of the winders at Woolley Colliery (Yorks) and Merthyr Vale Colliery (Glam) is to be undertaken by the heavy plant division of Associated Electrical Industries, Limited. The 1,750 h.p. a.c. winder for Woolley Colliery will replace a steam winder in the 1,120-ft., No. 2 shaft and, with two skips in balance, it will have an output of 480 tons an hour.

The mechanical part of this order will be undertaken by the sub-contractors, Uskside Engineering Company, Limited, Newport (Mon). The winder will be similar in construction to several recently installed in collieries in the South Barnsley Area, incorporating the Metrovick-Worsborough air/oil spring braking system as first installed to the general design of Mr. R. W. Worrall at Barrow Colliery in 1952. Mr. Worrall is now acting as consultant to Uskside Engineering.

The winder for Merthyr Vale Colliery will have an output of some 200 tons an hour from a depth of 1,627 ft. and AEI germanium rectifiers will be used for dynamic braking.

AEI has also received an order for a twin-motor d.c. drive for a 4,500-h.p. winder with Ward-Leonard control from the Union Corporation of South Africa, Limited.

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# Growing Success of Dip. Tech. Examination

FIRST woman to gain the Diploma in Technology with first class honours is Miss Mary E. Chambers of the Brunel College of Technology, Acton, London. She is the second woman to gain the diploma. The first awards have been made in Wales, 11 students at the Welsh College of Advanced Technology having gained the Dip.Tech.(Engineering).

So far 204 diplomas have been awarded and some 4,000 students are studying for the diploma which is equivalent in standing to an honours degree of a British university.

Some of the firms represented by successful students are:—G. A. Harvey & Company (London), Limited, British Oxygen Research & Development, Limited, Permutit Company, Limited, Richard Thomas & Baldwins, Limited, E.M.I., Limited, Mond Nickel Company, Limited, Telegraph Construction & Maintenance Company, Limited, British Insulated Callender's Cables, Limited, General Electric Company, Limited, Mining & Chemical Products, Limited.

John Thompson, Limited, Villiers Engineering Company, Limited, Joseph Sankey & Sons, Limited, Henry Meadows, Limited, Boulton Paul Aircraft, Limited, Marston Excelsior, Limited, British Aluminium Company, Limited, Guest Keen Iron & Steel Company, Limited, Edward Curran Engineering Company, Limited, Steel Company of Wales, Limited, and B.S.A. Tools, Limited.

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MCKECHNIE BROS., LIMITED—Final dividend of 12½ per cent. makes 17½ (15) per cent. for the year ended July 31, 1960, in addition to which a 5 (same) per cent. tax free distribution is to be made out of non-taxable profits. Group net profit was £770,652 (£617,051), after tax of £598,940 (£326,783).

# IRON AND STEEL TRADE

## No Change in General Level of Prices This Year

CONSUMERS have no need to fear an increase in steel prices this year. On the other hand, they should not expect any fall in prices. The Iron and Steel Board has decided on a general policy of "no change" for the time being, despite the increase in the cost of coal. There may be a few minor amendments, up or down, before the end of 1960, but they will not materially affect the overall price structure.

The recent rises in the prices of coal and coke have added directly some £13,000,000 a year, or 14s. per ton, to the production cost of steel. The Iron and Steel Board considered the effect on the industry of this extra burden at a meeting on Tuesday. The board decided not to make any general increase in steel prices as a result of the higher coal and coke costs. On the other hand, the higher costs have made it impossible to make further steel price reductions in continuation of the downward movement of the past two years.

Any further changes which may be made this year in iron and steel prices are likely to be limited to a few products only, or to details of price structure, and are not expected to have any appreciable effect on the general level of prices.

### Pig-iron

Plentiful supplies of all grades of pig-iron are available, though the steelworks are maintaining their high level of intake of basic pig-iron. In the foundry grades the low phosphorus irons continue in heaviest demand.

The supply of high phosphorus foundry irons is more than adequate to meet the call and some consignments are being shipped oversea.

### Ferro-alloys

After two reductions in price in successive weeks there has been a slight increase in the price of ferro-tungsten. The new price is 11s. 8d. per lb. W contained, and tungsten metal powder is similarly increased to 14s. 8d. per lb. The demand for ferro-tungsten is relatively steady.

Both the 45 per cent. Si and 75 per cent Si grades of ferro-silicon are well supported and ferro-chrome is quite active.

### Semi-finished Steel

Although the re-rollers are still restricted to a certain extent by the lack of suitable labour, they continue to maintain outputs at fairly high levels. The demand for small bars and light sections is sustained and there is no relaxation of the pressure for reinforcing rods.

Home steelworks continue to send forward substantial tonnages of billets, blooms, and slabs, and arisings at the steelworks of suitable re-rolling quality defectives and crops are being accepted.

### Finished Steel

There is no falling off in the demand for all kinds of plate, particularly for the lighter gauges for which rolling dates have had to be extended. Orders for the heavier type of plate can still be placed for reasonable delivery.

Firms catering for constructional engineers have some spare capacity, while those dealing in colliery requirements would welcome any signs of brisker trade. There has been no slackening in the call for galvanized sheet, but pressure has eased for cold rolled strip and good commercial quality bright bars.

## British Oxygen Reorganization

FOLLOWING resumption of trading by the British Oxygen Company, Limited, under its own name, British Oxygen Gases, Limited, British Oxygen Engineering, Limited, British Oxygen Research & Development, Limited, Quasi-Arc, Limited, Sparklets, Limited, and A. Charles King, Limited, will continue as agents for the parent company until December 31.

The reorganization is designed to realign the widespread activities of the group in the UK in the most effective pattern and all current trade marks and trade names will continue to be used. This means that while British Oxygen Gases and Quasi-Arc, as such cease to operate, all the well-known British Oxygen and Quasi-Arc and allied trade marks will continue to be used for products in this field.

A new sales division of British Oxygen will be responsible for all group selling activities in the UK excluding chemicals. A new technical division is to be set up, and it is proposed to enlarge the technical centre at Cricklewood which will have enhanced importance through concentration of technical development of products and processes backing up the whole of the home and export selling effort.

It is considered that under the new regime greater resources than ever before can be devoted by the group to the development and promotion of all their products and processes, especially those in the field of welding and cutting.

VOLUME OF OUTPUT in the engineering and electrical goods industries in August was, according to provisional Board of Trade estimates, 8 per cent. up on August, 1959. This was the same increase as in the previous three months. New orders were received in the industries producing engineering and electrical goods, locomotives and railway track equipment, railway carriages and wagons, heavy commercial vehicles, and wheeled tractors at a higher rate in July and August than in the second quarter.

# Obituary

## BRIG. W. H. CROSLAND

THE death has taken place at the age of 65 of Brig. Walter Hugh Crosland who combined a distinguished military career with one of like success in commerce. He was chairman and founder of a large group of companies whose wide interests varied from merchanting iron and steel to sheep and cattle breeding in South America. He was chairman of Parson & Crosland, Limited, iron and steel merchants, agents, and exporters, of London, E.C.2, and its subsidiaries, and of Dyson, Jones & Company, Limited, Middlesbrough iron and steel merchants, Ferguson Battery Company, Limited, George Robinson & Son, Limited, and Scott Bros., Limited.

Brig. Crosland served in the first world war with the Berkshire Yeomanry and at the outbreak of the last war was in command. He rose to command the 9th AGRA during the European campaign and for this service was made CBE and awarded the DSO. He retained his interest in military affairs until his death. He led a trade mission to the Caribbean on behalf of the Government in 1952 and later became chairman of the Latin-American committee of the Dollar Export Council.

## MR. D. LUTHER PHILLIPS

THE death has taken place of Mr. D. Luther Phillips, well-known to many members of the British Iron and Steel Research Association and people in the steel industry, particularly in South Wales. He joined BISRA in its early days—in 1946—and for eight years led the Sketty Hall team in a succession of important research projects related to the coating of steel. He retired from the headship of the Sketty Hall laboratories in 1954, but continued to act in a consultative capacity.

Mr. Phillips, after graduating with honours in chemistry from the University College of Wales in 1911, was awarded an industrial bursary at the iron and steel works of Baldwins, Limited, at Landore. Subsequently he held the posts of chief chemist and metallurgist, blast-furnace manager, and works manager. In 1931 he took up the position of senior research officer of the local Steel Plate Association in the metallurgical department of the University College, Swansea, and in 1937 visited the US on behalf of the local research committee.

It was at that time that his work on strain age hardening culminated in a joint paper with Dr. C. A. Edwards and Mr. H. N. Jones, a work that aroused considerable interest as indicating a new approach to an important problem.

## MR. HARRY FERGUSON

THE death took place on Tuesday at the age of 75 of Mr. Harry Ferguson, tractor and automobile engineer, designer, and industrialist. His career began in 1900, but it was when he was asked by the Irish Department of Agriculture in the first world war to supervise the operation and maintenance of all tractors and agricultural implements in the country, that he became a pioneer in agricultural mechanization.

His efforts led to the Ferguson tractor and an association with Henry Ford which produced 350,000 Ferguson tractors. Mr. Ferguson had earlier collaborated with the Yorkshire industrialist, Mr. David Brown, in the production of a revolutionary tractor, the first machine to incorporate the now universal hydraulic lift principle. In 1953 Mr. Ferguson joined forces with Massey-Harris but a year later resigned as chairman and director to devote himself to developing other inventions outside the agricultural machinery field.

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Mr. JOHN CYRIL MOORE HEATHCOTE, foreman bricklayer at the NCB Area workshops at Markham Colliery, has died at the age of 52.

The death occurred on Wednesday of last week of Mr. ALONZO AINSLEY SENIOR, engineer at Hartley Bank Colliery (Yorks). He joined the pit 41 years ago from Lofthouse Colliery and had been engineer there for 20 years. He was 61.

Former undermanager at Cannock Wood Colliery (Staffs) for 30 years, Mr. ROBERT MILES has died at the age of 91. He began his career in North Staffordshire mines in 1881. He was promoted overman at Hanley Deep Pit and moved to Cannock Wood as undermanager in 1907.

The death has occurred of Mr. THOMAS MARK PRIESTWOOD former Manchester representative of the West Midlands Divisional Coal Board. For many years he was colliery sales manager for Settle, Speakman & Company, Limited, Stoke-on-Trent. He joined the NCB on nationalization and retired five years ago.

The death has occurred of Mr. VINCENT E. UPTON at the age of 70. He was managing director of Leigh & Sillavan, Limited, and a member of the Iron and Steel Institute, the Institute of Metals, and the Institute of British Foundrymen, joining the latter in 1933.

Mr. WILLIAM T. SMITH, former chairman and managing director of Alexander Hall & Company, Limited, shipbuilders, of Aberdeen, has died at the age of 70. He began his career as an apprentice shipwright with the company and retired from active management four years ago.

The death has occurred of Mr. S. G. CLARK, former chairman and managing director of Flockton, Tompkin & Company, Limited, steel tool manufacturers, and Henry Stones, Limited, file, drill, and hacksaw manufacturers, both of Sheffield. He was 70 and retired from active business in 1959. Mr. Clark was a holder of the Mappin Gold Medal.

The death has occurred of Mr. GEORGE BRYDEN, chairman and managing director of George Bryden Engineering Company, Limited, Leeds. He was 60. Mr. Bryden was formerly managing director of Landmaster, Limited, a member of the Firth Cleveland, Limited, group, a post he relinquished two years ago because of ill health. He had also been managing director of Marshall Sons & Company, Limited, engineers, etc., of Gainsborough (Lincs).

The death has occurred at the age of 66 of Mr. WILFRED HARRISON, joint author with Dr. F. C. Simmatt of "The Determination of Carbon Dioxide in Coal." After being engaged in research at Manchester University, Mr. Harrison joined the Garswood Hall Collieries Company, Limited, as a chemist, later becoming deputy gas engineer with Wigan Corporation. In 1943 he joined the Opencast Executive of the National Coal Board as preparation officer.

# Mr. R. Ringham to Retire

## CHAIRMAN OF EAST MIDLANDS DIVISIONAL COAL BOARD

"ONE of the industry's outstanding figures of his time" is the tribute paid to Mr. Rex Ringham by the National Coal Board in announcing Mr. Ringham's retirement, on December 31, from the chairmanship of the East Midlands Divisional Coal Board. The board, expressing its "warmest appreciation for the devoted service Mr. Ringham has rendered to the coal industry," states that under his leadership the division, the largest coal-producing area in the country, has repeatedly broken output and productivity records and achieved a financial return second to none, recording profits of over £147,000,000, before charging interest.

In 1959 the division was the first to reach the 40 cwt. overall output per manshift for the whole of the division over a full year. During the period of Mr. Ringham's office (from 1952) industrial relations have been so high that no more than about three day's saleable output has been lost through disputes.

MR. R. RINGHAM

Mr. Ringham, who has been 47 years in the industry, was born in Mansfield in 1894 and educated at Oundle. He entered the industry as a mining student in 1913, was appointed manager of Barlborough Colliery in 1922 and manager of Warsop Main Colliery in 1924, for the Staveley Coal & Iron Company, Limited.

### Deputy to Succeed

He became general manager of the company's collieries in 1938 and later joined the board of the Arkwright Coal Company, Limited. During the war he was chairman of Nottingham & Clifton Colliery, Limited, under the Ministry of Fuel and Power. Upon nationalization he was appointed general manager of the No. 1 (Chesterfield) Area, East Midlands Divisional Coal Board, and in 1948 the division's production director. From 1949 to 1951 he was its deputy chairman and assumed his present appointment in December, 1951.

Mr. Ringham was made CBE in the 1958 New Year Honours, and is a JP for Derbyshire .

The division's present deputy chairman, Mr. W. L. Miron, is to succeed Mr. Ringham. Mr. Miron, who was born in Llanelly in January, 1913, was educated at Llanelly Grammar School. He qualified as a solicitor in 1933 and in 1937 became solicitor to the Shipley Collieries, Limited, group.

During the war Mr. Miron served with the 9th Sherwood Foresters and later the 17th Indian Division. In 1946 he was appointed secretary of the East Midlands Divisional Board and became its legal adviser also soon afterwards. He succeeded Mr. Ringham in December, 1951.

# Pit Craftsmen Urged to Form Own Union

RESOLUTION was passed on Sunday by the Derbyshire Area council of the National Union of Mineworkers calling for the national executive of the NUM to negotiate an increase of £1 a shift for 400,000 mechanics and electricians in the coal industry. Mr. Bert Wynn, Area secretary, suggested that the craftsmen should form their own union.

Referring to the award of 1s. 8d. a shift by the Reference Tribunal in answer to the men's claim for 3s. 6d. a shift he said: "That decision in general was the correct one, although I am certain that had you engineers and fitters pressed on your own instead of being linked with other crafts you would have succeeded. I would say," he added, "that if many of you went into contracting or engineering outside the industry you could earn £4 or £5 a week more."

Last week the Derbyshire executive committee considered a resolution on differential payment for shift workers. This would mean that men on night shifts would get compensation for the loss of social activities. Mr. Wynn said that although the executive considered this claim urgent there were other needs—including a new wage increase for day men and an improvement of the sick pay agreement—which should be met first.

# Durham NCB Chairman Refutes Coal Price Rise Rumours

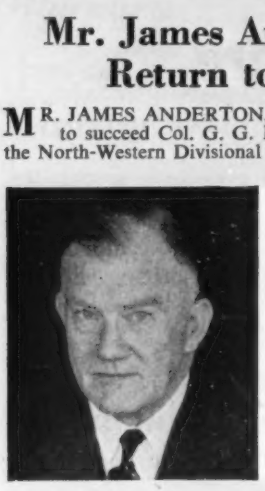
RECENT seamen's strike had cost the Durham Divisional Coal Board £250,000 and resulted in the dumping of 400,000 tons of coal, said Dr. W. Reid, chairman of the divisional board, speaking at Chester-le-Street recently. He refuted suggestions that the recent rise in coal prices would be the first of a series and said that he hoped it would be the last increase.

Referring to the closure, next year, of five small Durham pits, employing 650 miners, Dr. Reid said that most of the men would be transferred to other pits. If it had not been for the board's policy of deploying labour and the co-operation of the unions and managements, the number of pit closures in the division would have been twice as high.

The death has occurred of Mr. ALBERT TAYLOR, assistant cashier of the No. 4 (Carlton) Area of the North-Eastern Divisional Coal Board. He was 60.

# Mr. James Anderton to Return to Lancs

MR. JAMES ANDERTON, who has been appointed to succeed Col. G. G. H. Bolton as chairman of the North-Western Divisional Coal Board, has been the Scottish Divisional Coal Board's deputy chairman with special responsibility in the field of production and reconstruction, since September, 1958.



MR. JAMES ANDERTON

Mr. Anderton, who is 56, is well known throughout the industry, both in this country and oversea, as the man responsible for the invention and development of the Anderton shearer loader, a high-productivity coal cutter-loader which has had outstanding success in stepping up the output of coal obtained by rapid and continuous-mining methods.

After studying mining at the Wigan Mining and Technical College, he was employed by the Pearson & Knowles Coal & Iron Company, Limited, and the Wigan Coal Corporation, Limited. His appointments included assistant manager and manager of Maypole Colliery and manager of Mains and Ince Moss collieries.

In 1942 he was appointed agent and manager of Clock Face Colliery, St. Helens, and on nationalization he became assistant agent for a group of pits in the St. Helens Area. Three months later he was appointed agent and after serving for a time as Area production manager, he was appointed general manager of the No. 3 (St. Helens) Area, North-Western Division, in September, 1949.

In the short time that Mr. Anderton has been in Scotland he has played an active part in extending and improving the new power loading techniques now in wide use at Scottish collieries, and has entered wholeheartedly into the social and other activities of the Scottish Division. He was made OBE in the New Year Honours of 1956.

As was announced in IRON AND COAL last week, Mr. Anderton takes up his new appointment on January, 1, 1961, Col. Bolton retiring on December 31.

## DUCTILE STEELS DOUBLES PROFIT

DOUBLED group net profits are announced by Ductile Steels, Limited, Willenhall (Staffs), for the year ended June 30, 1960. A final dividend of 15 per cent. makes 22½ (15) per cent. for the year on a capital increased by a 100 per cent. scrip issue.

Group profits expanded from £388,458 to £844,112, which gives, after tax of £425,090 (£182,818), a net balance of £419,022 compared with £205,640.

TENDERS for India's first atomic power station to be built at Tarapur, some 62 miles north of Bombay, are being invited from all over the world. The station will produce about 300,000 kW and will consist of two nuclear reactors of equal capacity.

# *New Professor of Mining at Leeds*

COUNCIL of the University of Leeds has announced the appointment of Dr. H. J. King as Professor of Mining. He succeeds Prof. J. T. Whetton who has had the title Emeritus Professor conferred upon him.

Dr. King graduated from London University with a first class honours degree in engineering in 1946. From 1946 to 1947 he was lecturer in mining and surveying at the Whitwood Mining and Technical College, Castleford, and from 1949 to the present time he has held successively appointments as lecturer, senior lecturer, and reader in the department of mining at Leeds University. He is an authority on coal-mining methods and surveying and has had considerable practical experience in Rhondda collieries.

The university has also announced the appointment of Mr. P. Kelly as lecturer in the department of metallurgy and Mr. C. Mack as lecturer in textile engineering. The Department of Scientific and Industrial Research has awarded the university £7,000 over a period of three years for research into the electronic properties of metals and alloys and A.C.C. (Brotherton), Limited, has awarded £4,000 a year for 10 years for lectureships in chemical engineering and chemistry.

## Some Durham Miners Won't "Play Safe"

DURHAM mineworkers who remain accident free during the current quarter have a chance of winning a new car. This inducement is offered by the Durham Divisional Coal Board to stimulate even more interest in its successful Greater Safety campaign. In addition there are voucher and Premium Bond prizes.

Craghead Busty and Morrison Busty NUM lodges have, however, refused to accept prizes under the scheme because of dissatisfaction with the policy of payments to lower-grade underground workers carrying flame lamps, which it is stated has been adopted by the board.

Commenting on the lodges' decision, Mr. A. W. Williams, production manager, No. 6 (North-west Durham) Area, regretted that complaints had been allowed to mix with safety matters, particularly when there was a great surge of safety-consciousness in the division.

## *An "Outstanding Year" for IWS*

MORE than 10,000 delegates from industrial and commercial concerns all over the world will have attended the conferences, courses, and tutorials of the Industrial Welfare Society by the end of this year. This is a record and the society states that 1960 has been an outstanding year in its history.

Its 3,500 members represent more than 10,000,000 employees. It is the importance of these people and human values in an increasingly scientific and technical age that is the society's prime concern, for from them, it believes, stems economic success and a higher standard of living.

VICTORIA shipyard of Harland & Wolff, Limited, is to be closed early next year because of the lack of orders for suitable tonnage.

# MORE CAUTION IN INDUSTRY

## Costs Rise and Labour Still a Problem

STATE of industry in the UK is still one of over-full employment, with output continuing to rise, but despite this businessmen in a wide range of industries are somewhat less optimistic about prospects than they were four months ago. This conclusion emerges from the latest survey into industrial trends conducted by the Federation of British Industries, based on the replies of 728 chairmen and managing directors of a representative sample of manufacturing companies to questionnaires in the last week of September and the first week of October.

Replies emphasize one familiar point, states the FBI. This is that despite the measures taken to reduce home demand, exports have not risen to the extent necessary to support the country's high level of domestic activity. Some relaxation of the credit squeeze may soon be necessary if domestic demand is to be relied upon to justify the heavy industrial investment necessary for future growth.

Shortage of skilled labour is still the most important limiting factor on the expansion of output, but a larger minority of industrialists expects a shortage of orders over the next four months. Skilled labour is still known to be short in some industries, such as general engineering, but lack of customers is becoming a more serious factor for other industries, such as chemicals.

### Rise in New Orders

Number of firms working below capacity is little different from four months ago, the date of the last survey, but the position of those firms which do have idle plant appears to have got worse during the period. Total new orders are up on balance, though less so than output, and there has been no significant increase in export orders over the last four months.

Lack of capacity is no longer as important a factor in limiting output, the survey makes clear. On the question of whether expansion plans are likely to be cut back, the evidence is less conclusive. Capital expenditure authorizations for plant and machinery are expected to be higher in the next 12 months, but for new buildings the rising trend reported in the two previous inquiries has turned slightly downwards.

According to the survey, costs are again reported to have risen over a wide sector of industry, and with selling prices little changed, profit margins are again under pressure. Only 9 per cent. of those questioned said that average profit margins per unit had risen over the last four months. The rise in raw material stocks has continued.

The survey gives the general impression that the major part of industry is still very active, and with few exceptions there is enough work on hand to last the next four months. However, there is a good deal less optimism on the long-term outlook. One third of those replying are less optimistic than they were four months ago, and only one eighth more so.

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SKEFCO BALL BEARING COMPANY, LIMITED, Luton, which is to build a factory at Irvine (Ayrshire), is already recruiting in Scotland a nucleus of the technical staff for the new development.

## *Government Backing for Exporters*

TWO important new steps designed to help British exporters were announced by the Government on Thursday of last week. The first is the formation of a new Export Council for Europe, the object of which will be to increase Britain's share in one of the most rapidly expanding of world markets. It will be organized on the same lines as the Dollar Export Council and will be headed by Sir William McFadzean, chairman and managing director of British Insulated Callender's Cables, Limited, and president of the Federation of British Industries. The full membership of the council will be announced in a few weeks' time.

As a second aid, the Export Credits Guarantee Department has been authorized to ensure credit on longer terms than the normal maximum in certain special cases. These will be cases where it is necessary for a UK exporter to match terms offered by a foreign competitor who is backed by an export credit guarantee institution or equivalent official support.

There is no intention that the Government should take the initiative in lengthening terms of credit and each case will be considered on its merits, particularly having regard to the action of other Governments.

Another new concession is that of allowing the ECGD to offer "part-period" cover. In a case where a UK exporter would lose an order because a foreign competitor—although not backed by a credit insurance institution—is granting abnormally long terms, the ECGD may now give cover for a period which it would normally consider, leaving the exporter to give the extra credit at his own risk.

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## Shipbuilding Outlook "Not Reassuring"

IN the first nine months of 1960 15 ships of 140,000 tons gross were cancelled. The net addition to the order-book in that period fell short of completions by more than 700,000 tons gross and this continued shortfall in ordering confirms that the outlook for the industry is not reassuring, states the Shipbuilding Conference in its latest report.

During the third quarter of 1960 orders were placed in British shipyards for 38 merchant ships of 63,000 tons gross, bringing the total of new contracts for the nine months to September 30, to 176 ships of 417,000 tons gross.

# *French Steel Industry Prospers*

LOAN for the French steel industry, floated last month by the financial consortium, Groupement de l'Industrie Sidèrurgique, has been fully subscribed to a total of NF 340,000,000 (about £24,000,000). The issue, the eighth, took the form of that of last year—25-year bonds paying 5 per cent., but redeemable by annual drawing at 120 per cent.

GIS, whose capital of NF 100,000,000 is shared by over 60 steel companies and groups, reports that in 1959 considerable progress was made in all the main sectors of the country's iron and steel industry. Output of steel increased by 4.1 per cent. to reach 15,219,000 (14,616,000) tons, and turnover rose by 11.5 per cent. to NF 8,420,000,000 (NF 7,550,000,000).

French exports of steel and pig-iron reached a record level of 4,167,000 tons, representing an increase of over 30 per cent. on the previous year. Almost 12 per cent. of profits was devoted to depreciation and some 1.1 per cent. was distributed as dividend. The proportion of public funds involved in the industry's total debt continued to decrease as private investment accounted for an ever-increasing proportion of credits.

Output of crude steel is expected to reach 17,000,000 ingot tons this year and under a prospective fourth plan is expected in 1965 to reach 23,000,000 tons. Domestic consumption of steel is well below the level of that in the US, Germany, or Britain. The most recent figures for annual consumption per head are as follow:—France, 264 kilos; Britain, 364; Germany, 477; US, 489.

# New Belgian Stainless Steel Enterprise

PLANS for the formation of a major new stainless and special steel company in Belgium have been announced by the Allegheny Ludlum Steel Corporation, Pittsburgh, and the Belgian companies, Evence Coppée et Cie, Brussels, and Société Anonyme Metallurgique d'Esperance-Longdoz, Liège. Allegheny Ludlum will have equal ownership in the new enterprise with the Belgian concerns.

A new steel plant is to be built in Belgium complete with cold rolling and finishing facilities for supplying flat rolled stainless steel products, which will be sold in European and world markets. The initial capital investment is in excess of $10,000,000 and production is expected to begin in 1962.

## Izons & Company Celebrates 200 Years

BICENTENARY of Izons & Company, Limited, ironfounders and holloware manufacturers, of West Bromwich, was marked on Tuesday by presentations to all the employees. John Izon started the company at Birmingham in 1760 and it expanded so rapidly that he transferred to West Bromwich in 1782.

His great-great-granddaughter, Mrs. M. Jones, is a director of the company today. Mr. W. H. Thursfield, who made the presentations on Tuesday, has been managing director of the company for more than 20 years.

# Iron-ore Imports

IMPORTS of iron ore and concentrates (except chrome iron ore) and roasted iron pyrites in September, and the totals for the first nine months of this year and last, are shown in the table below.

| From | Month ended Sept. 30. | Nine months ended September 30. | |
|---|---|---|---|
| | 1960. | 1959. | 1960. |
| | Tons. | Tons. | Tons. |
| Sierra Leone | 35,350 | 510,336 | 565,744 |
| Canada | 493,745 | 1,787,581 | 2,506,406 |
| Other Commonwealth countries and Eire | 990 | 19,188 | 23,727 |
| Sweden | 475,658 | 2,312,939 | 3,590,218 |
| Norway | 19,212 | 187,770 | 249,839 |
| France | 36,474 | 330,820 | 433,860 |
| Portugal | 46,613 | 180,343 | 289,516 |
| Spain | 32,481 | 359,838 | 553,074 |
| Algeria | 158,320 | 1,044,382 | 1,554,523 |
| French West Africa | — | 177,218 | — |
| Tunisia | 45,300 | 362,217 | 564,907 |
| Morocco (excluding Tangier) | 30,125 | 285,121 | 603,675 |
| Liberia | 55,610 | 280,689 | 404,542 |
| Venezuela | 122,935 | 905,875 | 1,216,965 |
| Brazil | 26,238 | 410,392 | 450,343 |
| Other foreign countries | 79,992 | 120,312 | 562,218 |
| TOTAL | 1,659,043 | 9,275,021 | 13,569,557 |

## *Non-participation in State Pension Scheme*

DRAFT of the National Insurance (Non-participation —Continuity of Employment) Regulations, 1960, is under consideration by the National Insurance Advisory Committee, which is to report on the regulations to the Minister of Pensions and National Insurance. The regulations are designed to enable a certificate of non-participation in the new State pension scheme to remain in force when a new employer takes over a business and keeps on the existing scheme for which his predecessor was issued with the certificate.

Representations on the draft, which is obtainable, price 4d., from HM Stationery Office or through any bookseller, may be made to the committee not later than November 18, 1960. Representations, in writing, should be sent to the secretary, National Advisory Committee, 10, John Adam Street, London, W.C.2.

## Pickford Holland Plans to Expand

AMOUNT to be spent next year by Pickford Holland & Company, Limited, refractory manufacturers, of Sheffield, on capital assets will be much increased, states the chairman, Mr. R. Steel. In addition to the final payments for the new laboratory at the Totley works, extensions are being made to the works at Blaenavon and Cork for the manufacture of metal-clad bricks. Commitments amount to approximately £95,000.

The company experienced a low demand until the late autumn of 1959 when the position changed, states Mr. Steel. Stocks of finished bricks were used to meet the increased needs and at the turn of the year the works were, as now, operating at full capacity.

W. T. FLATHER, LIMITED—Mr. J. Edmonds and Dr. J. A. Naismith, officers of the company, have been appointed to the board.

# Silicon Iron—

## THE INFLUENCE OF CARBON AND NITROGEN ON ITS MAGNETIC PROPERTIES

*The efficiency of transformers, alternators, and other electrical machines is considerably reduced by the energy lost in their magnetic cores and the amount of energy lost depends on the quality of the core material. Recent research by the Metallurgy Division of the British Iron and Steel Research Association has led to important findings concerning the influence of the carbon and nitrogen content of silicon iron on its magnetic properties. A summary of these researches is given here, further details* being available from the Information Officer, BISRA, 11, Park Lane, London, W.1.*

MAGNETIC cores are usually made of silicon iron, an alloy which can be made into strip with excellent magnetic properties. Unfortunately, these magnetic properties may be seriously impaired by impurities in the alloy, and among those known to be harmful are carbon and nitrogen. Although no quantitative data were available, it has always been considered that carbon was the more harmful of the two. However, the investigation described below has shown that nitrogen is by far the worse offender.

To discover the effects of these impurities a series of tests were made on specimens of very pure vacuum-melted silicon iron, on specimens of the same alloy carefully contaminated with controlled amounts of carbon and nitrogen, and on specimens taken from a commercial alloy.

The specimens were processed in the same way as commercial alloys for magnetic cores, the heat treatment ending with a high-temperature anneal followed by a slow cool to room temperature. Since the room temperature solubility of carbon and nitrogen in silicon iron is very low, the impurities were, with this treatment, present as fully precipitated second phases.

The static hysteresis loss and coercive force of the very pure alloys were first determined, and the results plotted. Successively, greater amounts of carbon and nitrogen were then added to different specimens, and the determinations of hysteresis loss and coercive force repeated. The results, plotted on the graph with those for the pure alloy (Figs. 1 and 2), show clearly the variation of

* The relevant reports are:—MG/H/201/56, MG/H/81/57, MG/H/104/57, and MG/H/118/58, and in "Diffusion and Solubility of Nitrogen in Silicon Iron," by D. A. Leak, W. R. Thomas, and G. M. Leak, Acta Met, 1955, 3, 501; "The Influence of Impurities on the Magnetic Properties of High-purity 3 per Cent. Silicon Iron," by D. A. Leak and G. M. Leak, Journal, Iron and Steel Institute, 1957, 187, 190; "The Solubility and Diffusion of Carbon in a Silicon Iron Alloy," by D. A. Leak and G. M. Leak, Journal, Iron and Steel Institute, 1958, 189, 156.

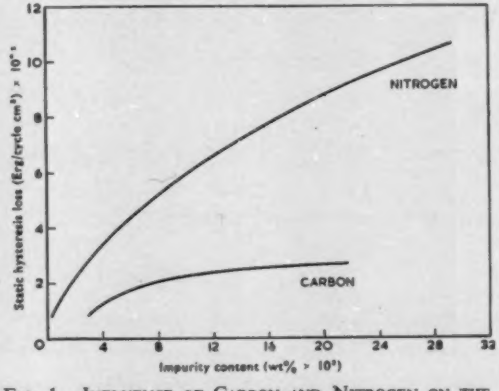



FIG. 1.—INFLUENCE OF CARBON AND NITROGEN ON THE HYSTERESIS LOSS OF HIGH-PURITY SILICON IRON.

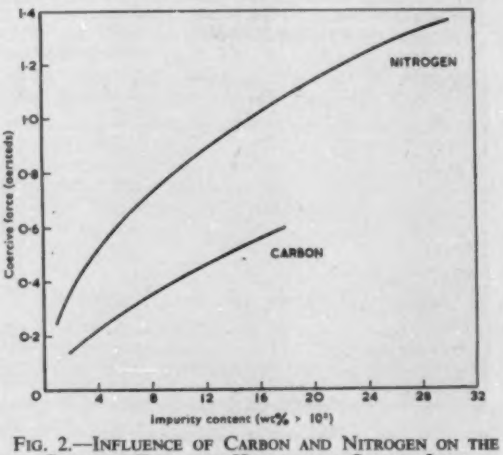



FIG. 2.—INFLUENCE OF CARBON AND NITROGEN ON THE COERCIVE FORCE OF HIGH-PURITY SILICON IRON.

## PHOTOMICROGRAPHS OF SILICON IRON

(*Magnification* × 1,000)

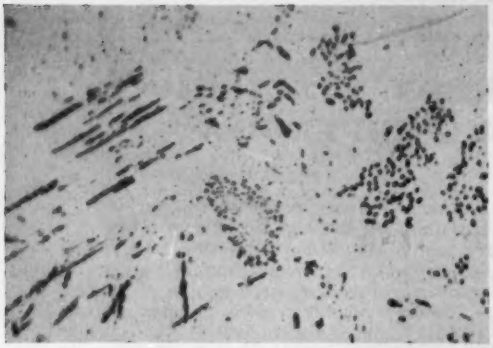


FIG. 6.—HIGH PURITY 3 PER CENT. SILICON IRON, 0.016 WT PER CENT. NITROGEN (GRAIN INTERIOR).

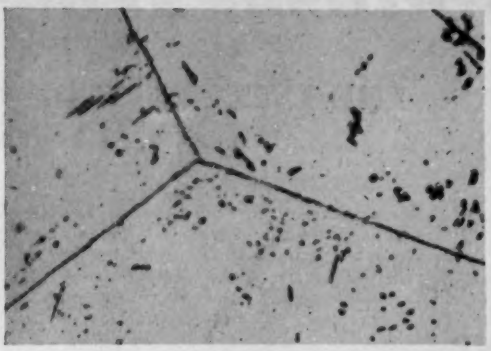


FIG. 7.—HIGH PURITY 3 PER CENT. SILICON IRON, 0.016 WT PER CENT. NITROGEN (GRAIN BOUNDARY).

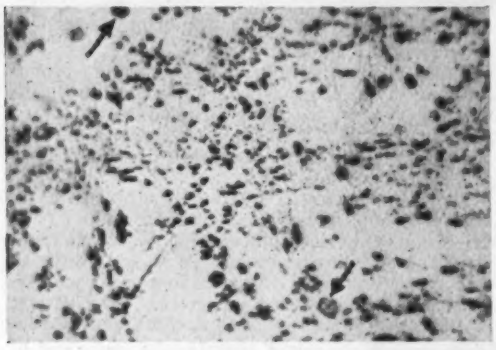


FIG. 8.—HIGH PURITY 3 PER CENT. SILICON IRON WITH 0.029 WT PER CENT. TITANIUM, 0.010 WT PER CENT. NITROGEN (GRAIN INTERIOR).

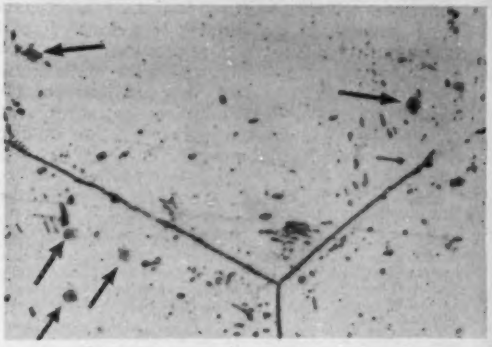


FIG. 9.—HIGH PURITY 3 PER CENT. SILICON IRON WITH 0.029 WT PER CENT. TITANIUM, 0.010 WT PER CENT. NITROGEN (GRAIN BOUNDARY).

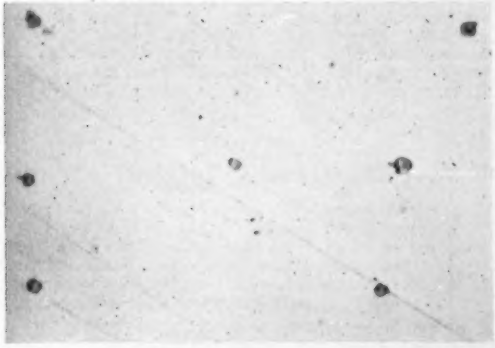


FIG. 10.—HIGH PURITY 3 PER CENT. SILICON IRON CONTAINING 0.029 WT PER CENT. TITANIUM, 0.004 WT PER CENT. NITROGEN.

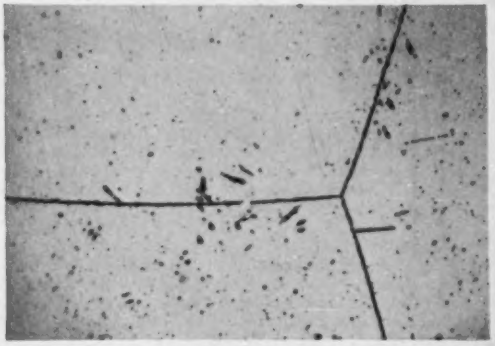


FIG. 11.—COMMERCIAL 3 PER CENT. SILICON IRON WITH 0.008 WT PER CENT. TITANIUM, 0.008 WT PER CENT. NITROGEN.

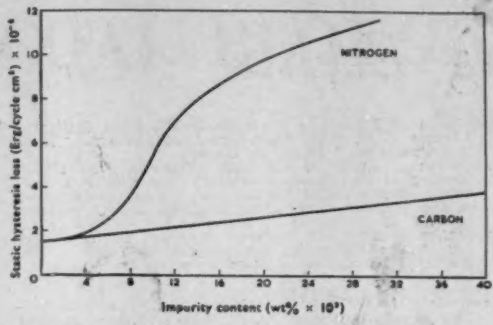



FIG. 3.—INFLUENCE OF CARBON AND NITROGEN ON THE HYSTERESIS LOSS OF "COMMERCIAL" SILICON.

magnetic properties with impurity content and demonstrate that, contrary to popular belief, the effect of nitrogen is much worse than that of carbon.

The results obtained when these determinations were repeated with a commercial alloy are shown in Figs. 3 and 4. Once again the influence of nitrogen is worse than that of carbon, but there is a very interesting difference in the curves of coercive force *v.* nitrogen content. At first the additions of nitrogen have little or no effect on the magnetic properties, and when at last they do start to affect these properties the relationship between coercive force and nitrogen content is linear—not the power relationship shown in Fig. 2.

The explanation is that the commercial alloy contained, as an impurity, 0.008 per cent. by weight of titanium, and that the titanium modified the effect of the nitrogen. This explanation was established by making a series of tests in which controlled amounts of titanium were added to the high purity alloy, giving the curves of coercive force *v.* nitrogen content shown in Fig. 5.

Analysis of the test specimen showed that additions of nitrogen were precipitated as titanium nitride until all the titanium was used up, and the flat initial part of the curve shows that this compound has no effect on coercive force. The steady rise from this point indicates that even after all the titanium has been combined, the titanium nitride modifies the form in which additional nitrogen is precipitated.

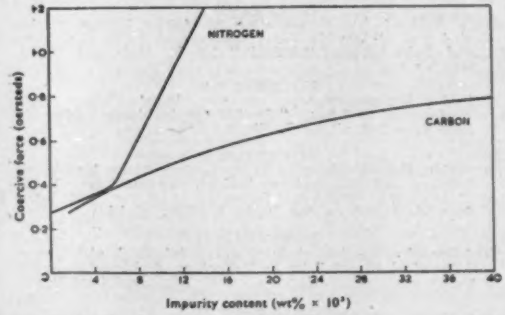



FIG. 4.—INFLUENCE OF CARBON AND NITROGEN ON THE COERCIVE FORCE OF "COMMERCIAL" SILICON IRON.

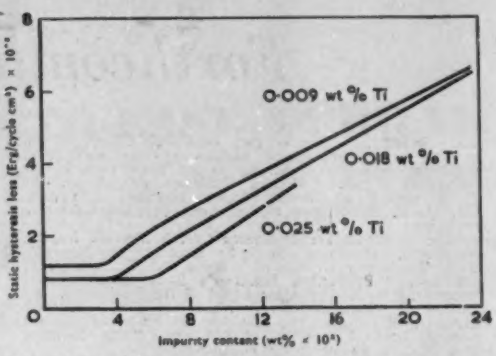



FIG. 5.—INFLUENCE OF NITROGEN ON THE HYSTERESIS LOSS OF HIGH-PURITY SILICON IRON CONTAINING TITANIUM.

This is clearly shown in the photomicrographs (Figs. 6-11). In high-purity silicon iron the nitrogen is precipitated as acicular iron nitride (Figs. 6 and 7); when titanium is present in the high-purity alloy the nitrogen is precipitated as cube-shaped particles of titanium nitride and a more rounded iron nitride: in Figs. 8 and 9 the arrows indicate typical titanium nitride particles. Initial additions of nitrogen to such an alloy all form titanium nitride (Fig. 10). In the commercial alloy, which contained 0.008 per cent. by weight of titanium, the iron nitride particles, as shown by Fig. 11, are also less acicular than in the high-purity alloy.

There are thought to be two mechanisms by which impurities can affect the magnetic properties of silicon iron:— (1) By modifying the recrystallization texture, and (2) by forming inclusions which hinder the wall movement of magnetic domains and so increase the hysteresis loss.

The strip used in these experiments did not have a very marked crystal preferred orientation, and the recrystallization texture was kept constant throughout the determinations. The results shown in Figs. 1-5 therefore show only the effects of the second mechanism.

## "Vacuum Plant for Steel Degassing"

MR. J. I. T. GREEN and Mr. D. M. Hayes, joint authors of the article on "Vacuum Plant for Steel Degassing" published in our October 14 issue, were both associated with the plant engineering and energy division of BISRA when the article was written.

Mr. Hayes is now on the staff of Round Oak Steel Works, Limited, Brierley Hill (Staffs).

# Forthcoming Events

OCTOBER 31

*Wigan and District Mining and Technical College*:—Joint meeting with the Junior Section of the Manchester Geological and Mining Society in the board room of the college at 5 p.m. "Modern Winding Installations," by J. M. Dobie, of British Ropes, Limited. Chairman, Col. G. G. H. Bolton, chairman of the North-Western Divisional Coal Board.

*Institution of Production Engineers (North Western Region, Manchester Graduate Section)*:—Meeting at Reynolds Hall, Manchester College of Science and Technology, at 7.15 p.m. "Production Engineer's Route to the Board Room," by G. R. Pryor, president of the institution.

*Institution of Plant Engineers (West and East Yorkshire Branch)*:—Meeting at the Houldsworth School of Applied Science, Leeds University, at 7.30 p.m. "The Building of a Modern Factory," by Philip Wyatt.

*Institution of Electrical Engineers (East Anglian Sub-centre)*:—Meeting at the Assembly House, Norwich, at 7.30 p.m. "Modern Coal-fired Power Stations," by A. E. Hawkins.

*Institution of Electrical Engineers (Mersey and North Wales Centre)*:—Meeting at the Royal Institution, Colquitt Street, Liverpool, at 6.30 p.m. "The Application of Irradiation in Industry," by M. C. Crowley-Milling.

*Institution of Mechanical Engineers (Applied Mechanics and Lubrication Groups)*:—Meeting at 1, Birdcage Walk, London, S.W.1, at 6 p.m.: "Rolling Bearing Problems—Is There a Need for Fundamental Research?" (discussion).

*Leeds University Union Mining Society*:—Meeting in the Mining Lecture Theatre at 5.15 p.m. "A Comparative Study of Mine Roadway Supports Under Difficult Conditions," by Dr. G. Zeppernick, of the Heintzmann Company, Germany.

NOVEMBER 1

*Institution of Chemical Engineers (North Western Branch)*:—Meeting at the Blossoms Hotel, Chester, at 7.30 p.m. "Prediction of Ternary Data from Binary Systems," by E. Evans.

*Institution of Production Engineers (Luton Section)*:—Joint meeting with the Eastern Branch of the Institution of Mechanical Engineers, at W. H. Allen, Sons & Company, Limited, Queens Works, Bedford, at 7.30 p.m. "1960-1970 Trends in Metallic Materials During the Next Decade," by Dr. N. P. Inglis.

*Institution of Plant Engineers*:—Meeting at the Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2, at 7 p.m. "Municipal Engineering Services," by A. F. Holt.

*Institution of Plant Engineers (Peterborough Branch)*:—Meeting at the White Lion Hotel, Church Street, Peterborough, at 7.30 p.m. "The Development of Smokeless Fuels," by J. Owen, assistant director, NCB Coal Research Establishment, Stoke Orchard.

*Institution of Electrical Engineers (North-Eastern Centre)*:—Meeting at Workington College of Further Education at 7 p.m. "The Impulse Strength of Impregnated-paper Dielectrics as Used in High-voltage Cables," by Dr. B. Salvage and J. A. M. Gibbons.

*Institution of Electrical Engineers (North Midland Centre)*:—Meeting at the Leeds and County Conservative Club, South Parade, Leeds 1, at 6.30 p.m. "A New Form of Crane-hoist Control Using a 3:1 Pole-changing Induction Motor," by O. I. Butler.

*Institution of Mechanical Engineers (Northern Ireland Branch)*:—Meeting at Belfast Museum and Art Gallery, "The Scientist's Contribution to Mechanical Engineering," by Prof. O. A. Saunders.

NOVEMBER 1-3

*Institute of Welding*:—Autumn meeting at 54, Princes Gate, Exhibition Road, South Kensington, London, S.W.7. Theme of the meeting is "The Metallurgy of Welding and the Allied Processes."

NOVEMBER 2

*Combustion Engineering Association*:—Meeting at the Gloucester Hotel, 102, Union Street, Aberdeen, at 10 a.m. "The Automatic Boilerhouse"; "Research by the British Coal Utilization Research Association," by G. G. Thurlow; "Instrumentation and Control," by R. F. Hirsh; "The Problems of the User," by Alan Wilson.

*Institution of Production Engineers (Nottingham Section)*:—Meeting at the Reform Club, Victoria Street, Nottingham, at 7 p.m. "Tractor Design and Production," by M. Ashfield.

*Institution of Production Engineers (Crawley Group)*:—Meeting at A.P.V., Limited, Crawley, at 7 p.m. "A Review of the Vacuum Diecasting Process," by J. S. Addiscott.

*Institution of Production Engineers (South Essex Section)*:—Meeting at 42, High Road, Ilford, at 7.30 p.m. "Metal Box Production," by R. E. Geeson.

*Institution of Electrical Engineers (Tees-side Sub-centre)*:—Meeting at the Cleveland Scientific and Technical Institution, Middlesbrough, at 6.30 p.m. "Some Considerations in the Application of Power Rectifiers and Converters," by J. P. McBreen.

*Institution of Electrical Engineers (Southern Centre)*:—Meeting at The University, Southampton, at 7 p.m. "The Electrical Simulation of Heat Flow in the Analysis of Cooling Systems for Electrical Equipment," by E. M. Weedy.

*Institution of Mechanical Engineers (Yorkshire Branch)*:—Meeting at The University, St. George's Square, Sheffield, at 6.30 p.m. "The Application of Pneumatic Equipment to the Centralized Control of Compressors," by E. N. Martin and T. W. Wilkinson.

NOVEMBER 3

*Midland Institute of Mining Engineers*:—Meeting at the Danum Hotel, Doncaster, at 2.30 p.m. "The Organization of Management and Maintenance in Coal Mines in the USA," by M. Brocklesby.

*Institution of Electrical Engineers*:—Joint meeting with the Institutions of Civil and Mechanical Engineers at Savoy Place, London, W.C.2, at 5.30 p.m. "The Training of Oversea Graduate Engineers," by Dr. William Abbott.

*Institute of Welding (Tyneside Branch)*:—Meeting at Neville Hall, Newcastle-upon-Tyne, at 7 p.m. "Some Aspects of $CO_2$ Welding," by P. Collins and G. Blackhurst.

*Institution of Mechanical Engineers (Scottish Branch)*:—Meeting at the Royal College of Science and Technology, Glasgow, C.1, at 7.30 p.m. "Direct Conversion of Heat to Electricity," by P. D. Dunn.

*Institution of Mechanical Engineers (East Midlands Branch)*:—Meeting at the Technical College, Lincoln, at 7.15 p.m. "Quality in Engineering Manufacture," by F. Nixon.

NOVEMBER 4

*Society of Chemical Industry*:—Meeting at the Royal College of Science and Technology, George Street, Glasgow, at 6 p.m. Tennant Memorial Lecture: "Melting and Freezing," by Prof. A. R. Ubbelohde, FRS.

*North East Coast Institution of Engineers and Shipbuilders*:—Meeting in the Lecture Theatre of the Literary and Philosophical Society, Newcastle-upon-Tyne, at 6.15 p.m. "Sir Claude D. Gibb—Engineer" (Parsons Memorial Lecture), by Dr. A. T. Bowden

NOVEMBER 7

*Institute of British Foundrymen (Sheffield Branch)*:—Meeting at the Technical College, Pond Street, Sheffield, at 7 p.m. "Precision in Casting," by A. Short.

## National Association of Colliery Managers

NOVEMBER 4

*North of England Branch*:—Annual dinner and dance at the Old Assembly Rooms, Newcastle-upon-Tyne 1.

NOVEMBER 7

*South Midland Branch*:—Meeting at Ashby Rescue Station at 4 p.m. "The Workable Reserves of South Derbyshire and Leicestershire Coalfields," by M. Hall and W. J. Hutchinson.

NOVEMBER 15

*Yorkshire Branch*:—Meeting at the Miners' Welfare Hall, Brodsworth, at 3 p.m. "Analysis of Accidents During the Last Five Years," by J. Blunt.

NOVEMBER 23

*Lancashire Branch*:—Meeting in the Lecture Room, Manchester Literary and Philosophical Society, George Street, R. H. Clough, HM Divisional Inspector of Mines, will introduce his report on the North Western Division for 1959.

NOVEMBER 25

*Kent Branch*:—Meeting at the Swan Hotel, Deal, at 7.15 p.m. "The Coal Plough," by J. McFarlane, divisional mechanization engineer, Northern (N & C) Divisional Coal Board.

NOVEMBER 28

*Midland Branch*:—Meeting at the Denman's Head Hotel, Sutton-in-Ashfield, at 6.30 p.m. Paper by G. A. Percival, ventilation engineer, No. 4 Area, East Midlands Divisional Coal Board.

# COAL PLOUGHS

## in NORTH-EAST DURHAM

### *Experience in Widely Differing Seams*

By J. E. WILLIAMS, B.Eng.(Min.)*, and F. DAVISON†

*In this paper, presented to the North of England Branch of the National Association of Colliery Managers on March 23, 1960, the authors describe the installation of coal ploughs at Washington Glebe and Usworth collieries. At Washington Glebe the hardness of the coal was uniform throughout the thickness of the seam, whereas at Usworth the hardness changed rapidly at the horizon chosen to form the floor of the face. The experience gained from these two installations shows that coal ploughs can be worked successfully in widely differing conditions and that results can be obtained which compare favourably with other mechanized methods.*

INSTALLATIONS of coal ploughs at Washington Glebe and Usworth collieries in No. 1 Area of the Durham Division of the NCB are described in this paper. Washington Glebe Colliery, where the first plough installation in the Durham Division was made, works the "cindered" or low-volatile coal with a volatile content from 8 to 21 per cent. The volatile and ash content of this coal can vary quite considerably over short distances. For example, in the face where the coal plough is installed, the figures are quite different in the mothergate as compared with the tailgate, where the volatile is 12 per cent. in the former and 19.8 per cent. in the latter. Table 1 gives some indication of variation in the chemical characteristics of the seams at this colliery.

TABLE 1.—*Analysis of Seams at Washington Glebe Colliery, Showing Variation in the Volatile Content of the Coal.*

| Seam. | District. | Volatile per cent. | Ash per cent. |
|---|---|---|---|
| Five quarter | "F" face .. .. .. | 8.0 | 3.5 |
| Maudlin .. | East No. 1, without dirt band | 21.1 | 3.5 |
| | " with band .. | — | 10.8 |
| Brass Thill .. | S.E. No. 1 Plough; mothergate | 12.1 | 10.2 |
| | " " tailgate .. | 19.8 | 4.7 |
| | East No. 4 .. .. .. | 22.3 | 5.1 |
| Hutton .. | South No. 9 .. .. .. | 10.0 | 14.0 |

The face chosen for the first plough installation was a fairly hard coal in the Brass Thill Seam. The average hardness of the seam was 68 when tested beforehand compared with a hardness or impact strength index of 71 for the floor. The roof parting was good and the floor parting moderately good. The thickness of the coal was 2 ft. 10 in. and dipped 1 in 19 from tailgate to mothergate at a depth of 735 ft.; the face length was 200 yd.

The single-unit face advancing to the south, delivers coal to a main trunk cable belt with a capacity of 180 ton/hr., through a 20-in. Cowlishaw Walker stage loader and a 30-in. gate belt of similar capacity. The transference of coal from the latter to the cable belt is effected through a small bunker feeding on to a short slow-moving scraper chain conveyor, enabling the coal to be fed evenly and centrally. The cable belt delivers coal to a main loading point close to the shaft bottom. The Anbauhobel was installed and went into production in January, 1959.

#### Operation of the Plough

The plough cuts to a depth of between 2 in. and 6 in. at a speed of 75 ft./min. The plough is driven by two 45-h.p. motors, which can work independently of the two conveyor motors. The higher forces available for pulling the plough when the motors act together, as well as the better distribution of forces in the plough chain make the Anbauhobel more efficient than the Lobbehobel where plough and conveyor are powered by the same drive. The maximum pulling force is 18 tons and the breaking load of the chain is 50 tons.

The plough shown in Figs. 1 and 2 comprises the plough base, a top portion to which various types of cutting bits can be attached, and swivelling kirving bits. Details of the plough are as follow:—Length, 6 ft. 6¾ in.; width, 3 ft. 7¾ in.; height adjustable, 11¾ in.; cutting depth, 2 in. to 6 in.; maximum pulling force, 18 tons.

* Group manager, Area No. 1, Durham Divisional Coal Board.
† Manager, Washington Glebe Colliery, Area No. 1, Durham Divisional Coal Board.

FIG. 1.—GENERAL VIEW OF THE ANBAUHOBEL.

Preliminary adjustment had to be made to the rams and to the electrical equipment, such as resetting of the overloads. On the first shift that the plough went into operation 230 tons of coal were filled, but crop coal, 14 in. thick, was left on the floor for some 30 to 50 yd. due in the main to a 15-in. fault 30 yd. from the mothergate. This crop coal had to be taken up by hand at the end of the ploughing shift. At the end of the week the plough was taken off and replaced with a new type having adjustable bottom blades. After an initial tendency to ride over the crop coal, further adjustment to the bottom blades and the fitting of a pre-cutting blade overcame the problem of crop coal.

Trouble was then encountered with the plough digging 2 in. to 4 in. into the floor and for some days this posed a considerable problem at the pit due to the fact that the proportion of the output consisted of untreated smalls and the presence of a large proportion of fine stone was having an adverse effect on the product. A pre-cutting blade of a different design to that supplied, was made at the pit and fitted to the plough body. This was found to give much better results and, after further trial with bottom blades and the pre-cutter, the plough was finally adjusted to cut at the correct horizon.

When first commencing to plough the pre-cutter supplied by the manufacturers broke on the first day it was in operation; this was replaced, after experiments with several types of pre-cutters made at the colliery. The one found to give the most satisfactory results consists of a 1-in. steel plate, out of which is cut three edges on each side, staggered at distances of 1½ in. This pre-cutter is welded on to a back plate, which is set at 90 deg. to the pre-cutter and is then bolted on to the plough base by four ⅞-in. dia. bolts.

A keyway is cut vertically up the centre of the back plate, which fits on to the plough body, in order to relieve the strain on the four bolts. This gives a pre-cut of approximately 4 in. and forms a horizon along which the plough can travel. The cutting edges of this pre-cutter are built up with Hardex 650 Electrode to give a hard-cutting edge.

Though it was assumed that the Anbauhobel drive unit would fit any type of armoured conveyor, it was found that in fact the BJ-D drive head would not take the plough unit without certain modifications.

### Repairs to Plough Chain

A set of wire rope pulley blocks (Fig. 3) is used for repairs to the plough chain The loose end of the rope is fitted with a steel claw, which fits on to the flight bar of the armoured conveyor. One pulley assembly is fitted with a steel claw, which is attached to the plough chain, and the other assembly is fitted to the other end of the plough chain by means of a coupling link. Starting up the armoured conveyor chain brings the two ends of the broken chain together.

When the chain breaks inside the pipes, several pipes are disconnected and a small-diameter flexible wire is passed through the tubes and connected

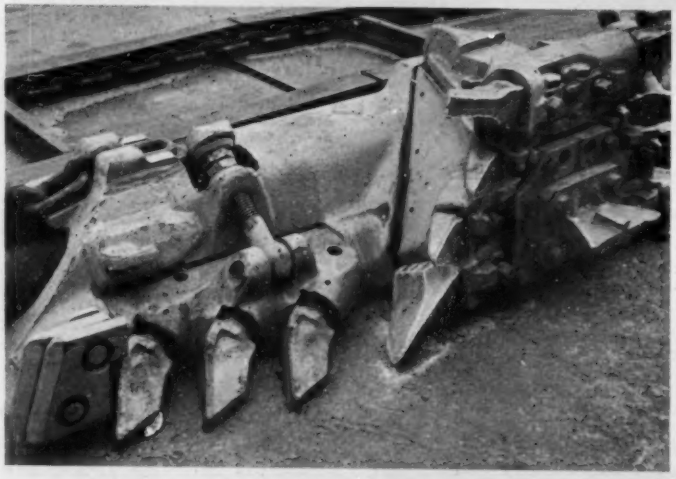


FIG. 2.—ADJUSTABLE PLOUGH BLADES WITH PLOUGH CHAIN FITTED IN TOP POSITION.

to the broken end. The outside chain is then disconnected from the plough body and with the help of the plough drive the ends are pulled together and connected with a coupling link. The tubes are then replaced on the armoured conveyor and the procedure for coupling up the outside chain carried out.

Unless certain simple precautions are taken there is a tendency for the guide tubes to become filled with a paste of fine wet coal and dirt sufficiently tight to stop the plough from working. Care has to be taken to avoid a pile of coal from accumulating at the point where the chain enters the tube. At the end of the week the plough should be disconnected and the chain run backwards and forwards through the tube. The effectiveness of this operation is enhanced by fitting special couplings in the chain which have been treated by a welding deposit to form a projecting profile on the coupling. This assists in clearing the inside of the tube of solidified deposit.

To effect repairs to the conveyor chain a special stop block, made of 1-in. thick steel plate and so shaped as to fit the top pan is used. The stop is bolted to the second pan from the conveyor drive, which is specially drilled and reinforced for this purpose. When the stop is in position the chain is reversed slowly, the flight bar coming to rest against it, which enables slack to be given, following which the flight bar or any damaged links can be taken out and replaced.

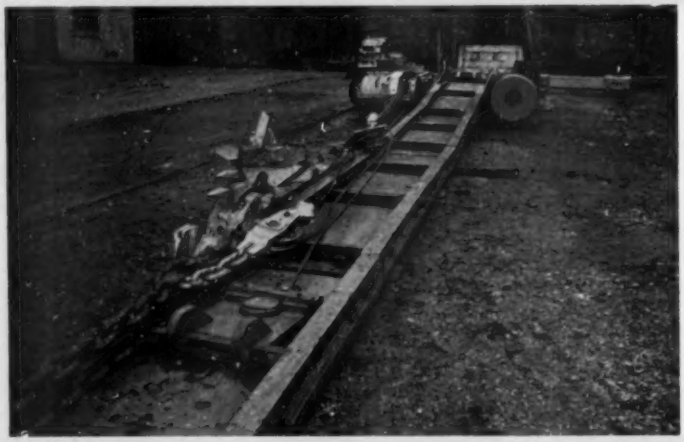


FIG. 3.—METHOD OF USING WIRE ROPE PULLEY BLOCKS WHEN REPAIRING THE PLOUGH CHAIN.

FIG. 4.—ANCHORAGE OF THE ARMOURED CONVEYOR DRIVE, SHOWING WIRE ROPE PULLEY BLOCKS FOR COUNTERACTING CONVEYOR MOVEMENT.

The BJ-D 24-in. armoured conveyor is of the C 20 type, with a chain speed of 120 ft./min., giving a maximum carrying capacity of 300 ton/hr. with spill plates or 120 ton/hr. without spill plates.

The drive unit is powered with two 50-h.p. motors running at 1,470 r.p.m., torque being transmitted through a hydraulic coupling to a gearbox with a 40 to 1 reduction.

The conveyor is anchored at the tailgate end of the face by means of a large beam, which, in turn, is secured by props set on steel shoes fitted to the beam. The conveyor is attached to the beam by means of wire rope pulley blocks (Fig. 4) held permanently in position and attached to the beam by means of a sliding shoe and to the conveyor by means of a steel bar bolted to the head frame. In order to pull up the armoured conveyor the two ends of the wire ropes are secured to a steel claw fitting on to the panzer flight bar, similar to the one used in repairing the plough chain. The movement of the panzer chain gradually moves up the tail-end drive unit and also tensions the whole conveyor.

### Hydraulic Pressure on the Rams

The Bonsor rams have a total thrust on the power stroke of 3.15 tons at 1,000 lb./sq. in. and 2.2 tons on the return stroke. The overall length when closed is 44¼ in. with a stroke of 30 in.

The Evans pump, circulating the hydraulic fluid consisting of

a mixture of 2 per cent. soluble oil and water, has a bore of 1 in. and a stroke of 4 in., giving a capacity of 6.2 gal./min. at 200 strokes/min. The maximum pressure is 1,500 lb./sq. in. and the capacity of the tank 50 gal.

During the opening phase of the installation the hydraulic pressure was maintained at 400 lb./sq. in.; this was found to be too high and after experimenting it was found that a pressure of between 250 and 300 lb./sq. in. was the best. There appeared to be no established pressure for any given kind of coal and adaptation of the most suitable pressure for the various hardness of coal can only be found by trial. At a much later stage in the life of the installation a hard patch of coal was encountered at the mothergate end of the face which restricted the amount of coal obtained per run of plough.

Considerable improvement was obtained by reducing the distance between rams over this length of face by introducing extra rams. Instead of the normal 20-ft. interval, four rams were set at 10-ft., and four at 5-ft. intervals without increasing the hydraulic pressure. A much greater consistency of applied pressure to the coal throughout the run of the plough, greatly increased the ability to take off coal. During the period experienced with hard coal at the mothergate end of the face it has been found necessary to use shotfiring extensively in order to loosen the coal and prevent the whole face from being held up.

### Signalling System

The signalling system is of the Davies Derby type E 2/9. In each of the six sections of the face there is a combined push and pull key; the push being used for ordinary signalling purposes and the pull wire is used as an emergency stop. When operated it stops both the plough and the armoured conveyor independent of the operator. The relay unit for this system is installed in the mothergate and when the emergency pull wire is operated a white light shows in the relay unit. This cannot be extinguished until the latch on the pull key in the section has been reset. In each section is a signal bell which repeats all signals which are being transmitted to the operator, thus informing the men of what signals are being transmitted. In addition, each section is supplied with a sound-powered telephone.

Power is fed from a 250-kVA transformer, feeding two Reyrolle multi-motor panels, the other panels are standard equipment. The plough switches consist of three Belmos Type DOR reversing contactor panels for feeding the plough motors. Two flexible trailing cables of 0.04-sq. in. cross section are carried up the face in troughing provided in the spill plates. The cables supply power for the plough and conveyor motors at the tail end. The troughs also house telephone and signal cables and hoses for the hydraulic rams.

It is advantageous to erect, if possible, a short length of structure on the surface including the conveyor drive, plough drive, anchorage, pushing cylinders, and switchgear. This has the advantage of serving as a check on all items, as well as being a useful demonstration to officials and workmen of what is required of them when installation takes place underground. After erection the equipment can be run to see that everything is in order.

Installation of pans underground should proceed, if possible, to the dip, and they are, therefore, despatched to the gate from which they will be laid and stacked in heaps of 10. At the same time the other items, plough chain, conveyor chain, spill plates, and cylinders are also sent to the same spot. It is suggested that the following matters should be attended to:—

(1) A straight face with a line marked on the roof; (2) the distance of the first row of props from the face should be 4 ft. 6 in. and at least 4 ft. between the temporary props set against the coal and the first row of props.

To complete the erection the delivery-end gearhead is so positioned to give a good delivery on to the feeder conveyor. The tailgate anchor beam is set at right angles to the face line and staked and tensioned by block and tackle. In tensioning the plough chain, care should be taken to ensure that a correct number of links are removed to leave an odd number of links in the chain lengths at all times.

Normally it is advisable to start with the plough body at its lowest height and equipped with the standard bits. Any alteration in the height of the plough body or in the combination of bits will be governed by local conditions, such as top coal, bands of stone, the strength of the floor, and ease of parting from the floor. In making the initial trial underground it is advisable to apply hydraulic pressure just sufficient to advance the conveyor, which will usually be found to be between 200 and 250 lb./sq. in. At least 8 in. of piston rod must be exposed on each ram to allow the conveyor to retract as the plough passes and it also follows that the plough must be no nearer to the spill plates by the same amount.

Supports in the stables must be at least 2 ft. 6 in. from the conveyor to allow the free entrance of the plough into the stables. For satisfactory results it is essential that a schedule be laid down by the manager detailing daily and weekly items requiring attention, maintenance, and lubrication, with particular reference to keeping bits sharp. The main essential to successful ploughing is the careful maintenance of a straight face.

The support system in the two installations at Washington Glebe and Usworth collieries is identical and consists of Dowty props and hinged bars set in "W" formation. Chocks are set at 6-ft. intervals along the goaf edge. Both mothergate and tailgate are driven as rib-side roads with no packs on the fast side. In the mothergate a 3-ft. advance caunch is taken in front of the conveyor gearhead to give ample working height and supported by 12-ft. girders set over TCR props.

The face under consideration had started from the solid and, after the first major break occurred,

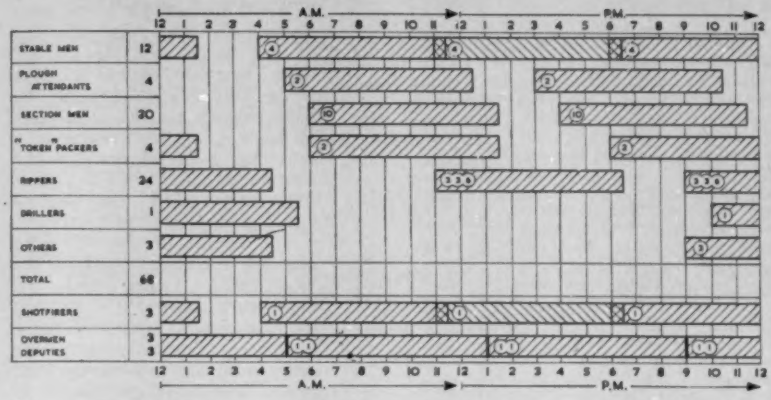

A.M.
P.M.
12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12
STABLE MEN 12
PLOUGH ATTENDANTS 4
SECTION MEN 20
"TOKEN" PACKERS 4
RIPPERS 24
DRILLERS 1
OTHERS 3
TOTAL 68
SHOTFIRERS 3
OVERMEN 3
DEPUTIES 3
12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12
A.M.
P.M.

FIG. 5.—ORGANIZATION OF MANPOWER ON THE PLOUGH FACE, USWORTH COLLIERY, WASHINGTON.

the ramble above the seam came away with the coal for more than half the face length. The thickness of ramble varied from between 6 in. and 24 in. This was caught by means of roof bolting in conjunction with the use of 5-ft. steel corrugated straps. Four holes were bored in the strap and the latter placed under the ramble edge, parallel to the face. The roof bolts were then drilled through the holes in the straps and securely bolted underneath the stone. This was found to be very effective in catching the ramble in the shortest possible time.

The stables are won and maintained by means of pulsed infusion blasting and the holes are drilled 6 ft. deep.

### Usworth Installation

The face at Usworth Colliery is 182 yd. long in a seam 3 ft. 4 in. thick, advancing on the strike. The centre gate in this case is a common return for the whole face. The face armoured conveyor feeds to a Cowlishaw Walker gate feeder of 180 ton/hr. capacity, which, in turn, feeds on to a 30-in. mothergate conveyor of the same capacity. A trunk conveyor delivers on to a Beien scraper chain of 300 ton/hr. to the loading point, which can easily deal with a tonnage per hour equal to the shaft capacity. The loading point is supplied with 2¼-ton mine cars, which are hauled to the winding shaft 2,000 yd. away by 12-ton English Electric battery locomotives.

The equipment used for the support of the face is identical with the Washington Glebe installation, although the seam characteristics are quite different. The coal, 3 ft. 4 in. thick, consists of a top portion of soft bright coal about 2 ft. 6 in. thick. The bottom part of the seam consists of cannel coal, merging into inferior cannel and gradually merging into a hard black mudstone, which, in turn, merges into a siltstone. These changes are only recognizable after careful examination. The result is that, whereas at Washington Glebe the coal was relatively uniformly hard throughout its height and varied little in hardness from the floor, at Usworth the hardness changed fairly quickly at the horizon at which the floor needed to be maintained.

In operation it was soon found that the plough climbed very quickly indeed and, following experience at Washington Glebe, it was thought that a pre-cutting blade would be necessary. Five different types were tried with three different angles of inclination from the horizontal, but none was successful and the advance for the first week was 4 ft. 2 in. In the second week the pre-cutter was taken off and the plough operated with the picks supplied. Again crop coal was left down and had to be taken up. It was decided from this experience that the kirving bits were too blunt in profile and needed redesigning. They were bent 1¼ in. from the straight and the blade angle was changed to 27 deg. These redesigned kirving picks succeeded, but it has been found necessary to change them after each shift because, to get the correct results, they must be kept sharp. In addition, a

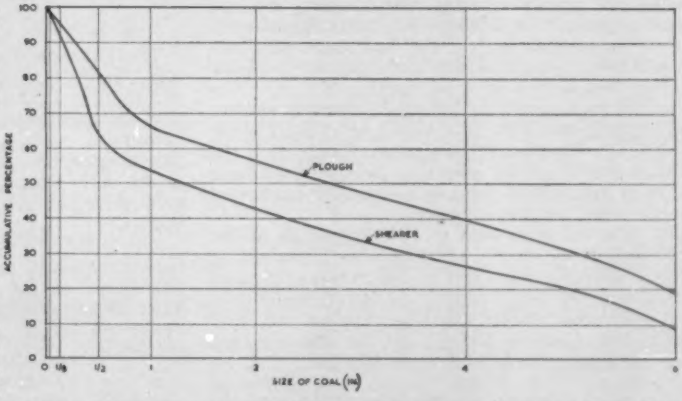



FIG. 6.—RESULTS OF SCREEN ANALYSES OBTAINED FROM BRASS THILL SEAM, GLEBE COLLIERY, WASHINGTON.

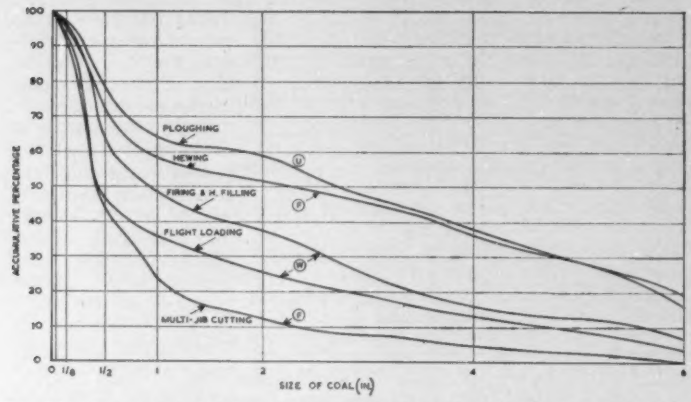



FIG. 7.—RESULTS OF SCREEN ANALYSES OBTAINED FROM HARVEY SEAM AT USWORTH (U), WASHINGTON (F), AND WARDLEY (W) COLLIERIES.

slight alteration was made to the main bottom picks, the profile being sharpened as in the case of the kirving picks.

Total cost of reservicing plough blades for a four-week period amounted to £27 3s. 5d.

As with the Washington Glebe installation, various trials of hydraulic pressure were made and it was found that the higher the pressure the more cropping takes place given the same conditions. The best pressure was found to be about 300 lb./sq. in. After the second week the plough was found to produce and operate satisfactorily with advances as follow:—First week, 4 ft. 2 in.; second week, 15 ft. 10 in.; third week, 25 ft. 7 in.; fourth week, 27 ft. 8 in.; fifth week, 30 ft. 3 in.;

After the fifth week the face was double shifted and the ensuing five weeks gave the following distances:—44 ft. 9 in.; 50 ft. 4 in.; 51 ft. 3 in.; 53 ft. 4 in.; 55 ft. 0 in.

An advance of up to 12 ft. per day maximum has brought some difficulties, as would be expected, in maintenance of stable holes and the caunch work. No difficulty has been experienced at the mothergate end of the face, but the stable at the tailgate has required extra labour to maintain the necessary rate of advance.

In the two gates not effected by coal, slusher packers are installed. In the loading gate the work is done by hand and the necessary rate of completion is achieved by means of careful adjustment of shift times and use of a strongly reinforced shelter over the stage loader.

In order to fit in with the winding shifts of the combined mine, the labour has been organized to give a maximum of 3½ hr. interruption of coal production on the plough face between the two coal-producing shifts. By overlapping the two shifts and utilizing the 3½ hr. to the greatest possible extent the caunchwork has been able to keep pace. The second caunchwork shift, of course, has an uninterrupted period of about 7½ hr. during the night. Fig. 5 is a bar graph showing shift arrangements.

With the plough working a double shift the total quantity of air required is 25,000 cu. ft./min. The centre gate of the face is a common return for the two halves which are fed by intakes at each end. The centre gate sampling point shows a CH.4 content of 0.4 per cent. and at the outbye end the average figure is 0.7 per cent.

The results of the screening analysis obtained from both the Washington Glebe and the Usworth installations show that the coal sizing from the ploughs compares favourably with any other method of working. The results are shown graphically in Figs. 6 and 7. The results obtained from the installation at Washington Glebe are shown in Table 2 and those from Usworth Colliery in Table 3.

TABLE 2.—*Results from the Plough Installation at Washington Glebe Colliery.*

| | Output per machine shift. | Face o.m.s. |
|---|---|---|
| | Tons. | Tons. |
| 1959—First quarter .. | 334.82 | 8.01 |
| Second ,, .. | 333.29 | 8.33 |
| Third ,, .. | 274.18 | 7.31 |
| Fourth ,, .. | 295.81 | 8.53 |
| .. | 309.64 | 8.02 |
| 1960—January .. | 267.74 | 8.50 |
| February .. | 333.00 | 8.82 |

TABLE 3.—*Results from the Plough Installation at Usworth Colliery.*

| | Output per machine shift | Face o.m.s. |
|---|---|---|
| | Tons. | Tons. |
| 1959—Fourth quarter | 355.65 | 8.60 |
| Average for 1959 .. | 355.65 | 8.60 |
| 1960—January .. | 309.32 | 7.79 |
| February .. | 272.65 | 6.97 |

## Conclusion

The experience gained from these two installations shows that the Anbauhobel can be worked successfully in fairly widely differing conditions and that results can be obtained which compare favourably with other mechanized methods. In this connection valuable assistance was received in the early stages of both installations from technical personnel at all levels of the board's organization.

The authors wish to thank Mr. S. J. Temperley, the Area general manager of No. 1 Area, Durham Division, for permission to publish the paper. They also wish to say that any views expressed are their own and not necessarily those of the National Coal Board.

## DISCUSSION

MR. T. HALL, opening the discussion, said that the plough was usually operated with and against the face gradient and asked if it was found that more coal

was produced from the upward than from the downward pull. The AUTHORS replied that more coal was obtained from the downward than from the upward pull.

MR. J. G. HELPS said the paper gave the height of the plough as 11¼ in. and asked if that was the overall height of the plough actually used in both cases. He was interested to see that the distance between the rams was reduced when hard coal was met. He had heard it said that if the distance between the rams was reduced the advantage of increased applied pressure was lost because of limited flexibility on the conveyor.

Replying, the AUTHORS said a standard plough with an extension was used for both installations, but it was possible to get a plough height up to 2 ft. 5½ in. When the 30-yd. length of very hard coal was encountered it was no use increasing hydraulic pressure to force the plough into the hard coal; it was thought that this would only fasten the plough against the face. An experiment was tried of setting rams at 10-ft. and 5-ft. intervals without increasing the hydraulic pressure. This assisted in getting a more uniform pressure of the plough into the coal and helped to increase advance.

MR. C. HARRISON noted that the profile of the kirving blades had been enlarged for the Usworth installation and asked what type of welding rod was used. He also asked if 27 deg. was considered the best angle and if it was found necessary to use a jig to sharpen to that 5 deg.

The AUTHORS said in reply that the picks that were tried often ripped into the floor. With narrow angled picks there was a strong tendency for the plough to rise. A 13-deg. angle was first tried and then 27 deg., and this angle did the job. Initially they had used the same kind of hardening rods that were used on the Washington Glebe installation, but later found that they had to use a different kind of hardening rod which was called "Verdur."

MR. J. KUTI said that although very good results had been achieved, some loss of available machine capacity was due to unavoidable delays, such as reversing the plough, tensioning chains, etc. There were, however, other external factors which affected the available machine capacity, such as transport, caunching, and roof conditions, and he wondered what were the most important of these particular items and which was regarded as the most important to tackle.

Replying, the AUTHORS said that transport was a limiting factor, but it was something which could be controlled, whereas roof conditions could not be entirely controlled. Caunching was also a limiting factor which, in the case of Usworth, had been overcome to some extent. An advance of 12 to 13 ft. per day was likely to limit machine capacity. Another factor was hard coal; there was also the physical capacity of the men. No special study had been made to see which was the most important factor.

## Coal-cutting Machine Problems

MR. TIMMS, JNR. said that in connection with hard coal, the attachment of a pre-cutter to the plough which took place to make the horizon for the next run, had been mentioned. He asked if any other method of pre-cutting had been tried, such as an ordinary coal cutter, cutting ahead of the plough. This had been adopted at one pit in Cannock Chase and water infusion was also tried along the whole length of the face. With regard to the trouble in the tubes which held the return chain, he asked if removing the tubes and placing the chain on top of the plough had been tried.

The AUTHORS remarked that so far as using a coal-cutting machine on an armoured conveyor was concerned, this produced problems of inconvenience, extra manpower, loss of time, and probable loss of output. Whether that method could be used and still maintain the same bulk output was very doubtful. A standard pre-cutting blade had been tried, but this broke in the first week and the blade which was being used now was made in conjunction with the Area mechanization team. It consisted of a 1-in. steel plate out of which were cut three edges on each side, staggered at distances of 1½ in. apart. This pre-cutter was welded on to a back plate which was set at 90 deg. to the pre-cutter and was bolted on to the plough base by four ¾-in. dia. bolts. It served two purposes by making an horizon and also pre-cutting up to 4 in., which certainly helped in ploughing hard coal.

With regard to water infusion, hard coal through the entire length of the face was not experienced; there was only one patch of about 30 yd. Holes 15 ft. deep were infused on that part of the face with water at 700 lb./sq. in. pressure and no effect was produced on the coal.

## Welding Deposit on Chain Links

As regards the chain, it was found that the ridge of the face chain was picking up damp kirvings and carrying them into the chain return pipe where they accumulated. A welding deposit was placed on certain links of the chain and this had been very successful. Every Friday the chain was taken off the plough, connected with an appropriate length of chain and run backwards and forwards through the tube; this was done every day during the weekend and kept the tubes reasonably clear. The chain was never worked without the links.

DR. W. REID asked the authors if they had considered the advantages of longwall retreating where the seam conditions permitted its application.

Longwall retreating, replied the AUTHORS, would imply having driven the roads before the production of coal. Not much thought had been given to this method, but, provided the seam was capable of being retreated and provided the forward abutment outbye of the retreating face presented no great problems, then it would be an advantage to retreat in a case where a high rate of face advanced was being restricted by the face ripping.

MR. H. W. STOREY asked if the effect of gas emission would be a limiting factor when considering retreating, and was told that it would not and samples taken along the waste edge never exceeded 0.4 per cent.

MR. MAUGHAN noted that although the number of rams had been increased and the blades altered, shotfiring was still used. He asked for details of the procedure for shotfiring on a plough face. The AUTHORS replied that, unfortunately, the hard coal was next to the mothergate and pulsed-infusion blasting was used for 30 yd.

MR. H. COLLINS asked, with regard to the rapid advance which had affected other determining factors, if it was a fact that one of the best installations in Durham was one which was advancing a certain fixed amount each day and not going for a big advance. The AUTHORS replied that the Washington Glebe plough was advancing steadily every day, as shown by the consistent weekly and monthly o.m.s. figures; a constant face o.m.s. of 8.02 tons was obtained during the year.

MR. R. S. MCLAREN said the rate of advance, even if the o.m.s. at the face was sacrificed, would simplify

the object of obtaining better bulk output from the units, and in the long run, would mean cheaper cost to the pit. The rate of advance and the amount of coal got was a very significant factor in addition to o.m.s. It was probably better to go for a maximum rate of advance. The AUTHORS mentioned 11 tons per man with a high rate of advance of 6 ft. to 7 ft. per shift. A 10-ft. advance with a reduction of 1 ton per man would still pay.

MR. E. K. WATSON asked if any trouble had been experienced with the top coal after the plough had advanced. In multi-jib working this could be one of the main drawbacks, even with a 4-ft. 6-in. undercut. The AUTHORS said this trouble was eliminated with a top blade, which could be fitted to the top of the plough. At neither of these installations was there any problem with top coal.

MR. W. SUMMERS said using hard wood chocks on the face with a 12-ft. advance meant moving the chocks forward seven to 10 times and asked if any consideration had been given to using hydraulic chocks to speed up operations. The AUTHORS replied that chocks used at Washington Glebe Colliery were prefabricating steel base chocks. The Desford chock had been tried, but this required two power lines.

In reply to MR. R. H. CHARLTON, who asked how crop coal was removed, the AUTHORS said the only way to remove the coal left down was to adjust the plough. In the case of Usworth it would be a very unprofitable undertaking to get it up.

MR. HEDLEY asked if the authors considered if faces in future installations could be longer. The AUTHORS said the ideal length should be a balance between face advance and length. Extra length meant less caunch work, but the extra length had other disadvantages such as greater strain on the equipment, more power needed, more supervision, operating against an extension of length.

MR. K. KAY asked if it would be advantageous to have a form of power support incorporated with the drive unit to assist in movement of the gearhead. The AUTHORS replied that this would have assisted in the installation of the second plough where there was 31-in. fault. Power supports in conjunction with the gearhead would certainly help.

MR. T. A. JONES asked if the elimination of chocks had been considered by increasing the prop density of the Dowtys. It was wrong to mix Dowty yielding props with ordinary wooden chocks, which had a negligible setting load. The AUTHORS replied that on the first face prefabricated steel chocks were used. On the second face the chocks were removed and the prop density increased; it was working very successfully.

MR. MAUGHAN asked, in using link bars, if any difficulty with wandering had been experienced and how often a new face line was established. He also asked what was the nature of the caunch and if the ripping shield stood up to shotfiring. The AUTHORS replied that the link bars did wander and a new line was put on the face nearly every day. The gates were 11-ft. by 9-ft. arch girders set on stilts and the tailgate was 10 ft. by 8 ft. The ripping shield was satisfactory.

MR. BRAIDFORD asked how the difficulty of drawing off chocks and waste before advancing roadside packs was surmounted. In reply, the AUTHORS said in both installations the method adopted was to use a "token" pack. A "token" pack was advanced a given distance from each gate and brought right up to the face before caunch work began so that the section men could work in accordance with the requirements of the regulations. MR. R. S. MCLAREN suggested that another name should be found for "token" pack.

In reply to MR. G. ROWELL, who asked if ploughing had any effect on safety records, the AUTHORS said it would be very foolish to positively assert that this was so, but figures did show in fact that for 1959 the accidents per 100,000 manshifts in the two plough faces were better than in all the other faces in the rest of the pit at both collieries concerned.

MR. BOOKER said the men removed a caunch 3 or 4 yd. in front of the face conveyor to give a clear run for the gearhead, and there was a 4-yd. pack to put on. He asked how the men were organized for this work. The AUTHORS replied that at Washington Glebe, on a single shift the caunch was about 12 ft. wide and about 2 ft. 6 in. thick. Two men loaded out the dirt on the scraper chain conveyor, and threw it to the back end of the pack. Four men followed on to work the main caunch.

## Determination of Airborne-dust Concentrations

SOURCES of error in the determination of airborne-dust concentrations by the thermal precipitator and by the P.R.U. hand pump are discussed in "The Thermal Precipitator and the P.R.U. Hand Pump: a Critical Study," by Dr. J. G. Dawes and B. A. Maguire, published by the Safety in Mines Research Establishment as Research Report No. 187.

Data are presented which illustrate the order of magnitude of the errors of various kinds. It is shown that the evaluation and instrumental errors associated with thermal-precipitator sampling in any given dust cloud are greater than the evaluation and instrumental errors of P.R.U. hand-pump sampling in the same dust cloud. The errors with both instruments are greater when sampling takes place underground than when samples are taken in a disaggregated dust-cloud produced in a laboratory wind tunnel. The relationship between thermal-precipitator and hand-pump measurements of dust-cloud concentration is briefly discussed.

The report, which includes 48 illustrations in its 64 pages, costs 5s. 6d. Copies may be obtained from the SMRE, Ministry of Power, Portobello Street, Sheffield 1.

## Use of Structural Steel in Building

PUBLISHED by the British Constructional Steelwork Association, 94/98, Petty France, London, S.W.1, at 3s. 6d., "Examples of Structural Steel Design to Conform with the Requirements of BS 449/1959," is a revised edition of BCSA brochures Nos. 1, 2, and 4, originally published in 1950 and 1951. The text has been completely rewritten to accord with the requirements of BS 449/1959, "The Use of Structural Steel in Building."

"The Use of Welding in Steel Building Structures," also published by the association at 3s. 6d., is a revised edition of BCSA brochure No. 6, originally published in 1952. The text and illustrations have been revised in conformity with the requirements of BS 449/1959. The subjects dealt with are fillet and butt welds, welded details, and built-up columns, and complete designs are given for a welded plate girder and a crane girder.

## WELDING RESEARCH

# *Programme of the British Welding Research Association*

*A strong case for increased income is submitted in the annual report for 1959-60 of the British Welding Research Association. It is a case which originates in the wishes of the member-firms themselves and is an expression, presumably, of their appreciation of the past and current work of the association.*

LAST year a minimum programme of work for the present five-year period was approved and this entailed an increase of £93,000 in the annual income. Firstly, to comply with the conditions for obtaining the DSIR's maximum grant towards this, members have increased their subscriptions. Secondly, and of equal importance, they have taken part in a research priorities survey of the current programme and have indicated what other researches they would like to see started.

Analysis of the returns of this survey has shown that members' evaluation of the importance of various projects is in broad agreement with the present allocation of funds by the research board. Members' indication of what new projects should be started comprised a list of no fewer than 104 suggestions. This is a most encouraging and progressive outlook on the part of members, who, of course, are not unaware that if new projects are to be undertaken a further increase in income will be required.

The year's research presented in the 1959-60 report covers almost every aspect of the welding of ferrous and non-ferrous metals, the five items referred to in this article being but a small sample, relating mainly to ferrous metallurgy. Copies of the report can be obtained from the association at 19, Fitzroy Square, London, W.1.

### Wide Plate Test for Brittle Fracture Study

The association has pioneered the wide plate test to study the conditions of stress and deformation likely to cause brittle fracture in actual steel structures. Results from this work complement those obtained from the Charpy V-notch and other small-scale tests, whose main function is in quality control. The wide plate test is performed with slowly applied load to fracture. Sufficient restraint is provided naturally in the specimen that the introduction of a welded butt joint with sawcut defects in the edges prepared for welding is sufficient in many cases to permit fracture at average applied stresses lower than yield point.

In previous reports, investigations have been described relating to fracture in several steels of British origin, balanced, and fully killed and normalized, and in plates 1 in. thick. The influences of such variables as type of welding electrode covering, degree of stress relief, shock, and fatigue loading have been described. This work on 1-in. thick material has been continued with equipment of 700 tons capacity, while a first programme involving 3-in. thick material and equipment of 2,000 tons capacity has been completed during the year.

### Steel Composition and Microstructure

Earlier work on a variety of steels, using small-scale transition temperature tests and the wide plate test, showed remarkable differences in behaviour between steels of similar composition and manufacture. Differing microstructures and, in particular, differing distributions of pearlite, could be observed, and a possible correlation between microstructure and transition temperature was sought. In the meantime, comparisons between parent materials on the one hand and weld heat-affected zones and artificially strain aged materials on the other hand, using the Charpy test, have shown that strain age embrittlement may also be involved.

Two important facts have been confirmed:— (1) That substantial strain ageing produced in the parent material near the weld by the action of welding may facilitate the production of low-stress fractures, especially those that are arrested when short; (2) that low-carbon steels vary appreciably in their susceptibility to strain ageing, as shown by the Charpy test: fully killed and normalized steels may be more susceptible than balanced steels in some circumstances. Further elucidation is still desirable, in particular of the interaction of compositional, microstructural, and ageing effects.

Since its earliest days, the association has regarded work on the properties of the welding arc as an important part of its research effort. The arc is not only a source of heat; it scours and cleans its way through plate material, controls

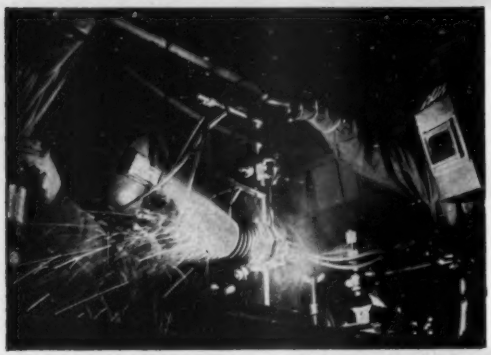


FIG. 1.—FUNDAMENTAL STUDY OF THE WELDING ARC AND THE MELTING OF THE FILLER WIRE.

the way metal is transferred, and influences the shape of the weld bead, while within its envelope a whole range of complex gas-slag-metal reactions and other metallurgical changes take place.

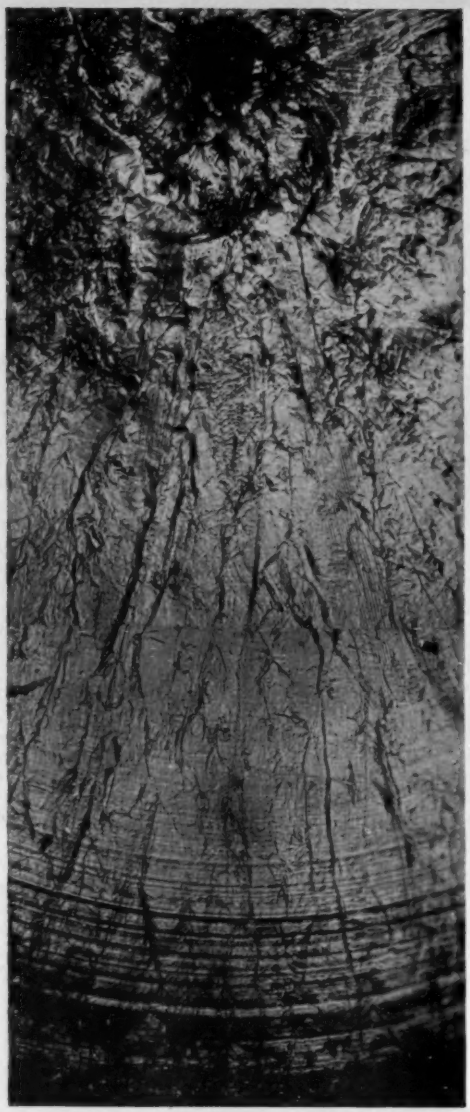
In recent years the association's work in this field has been mainly on the relationship between process variables and deposit characteristics and the collecting of data which are of immediate practical use as well as providing a basis for work on arc physics.

Further progress has been made in the systematic study of arcs of mild and stainless steels, copper alloys, titanium, and zirconium in argon and other gas mixtures. However, a direct approach to the problem of why and how metal is transferred from an electrode wire to a weld pool is now being made, using an experimental technique in which conditions in a metal-transferring arc are simulated so that independent adjustment of all the variables is possible. This involves feeding wire of the composition under investigation into the core of an extended arc between a non-consumable cathode and a specially shaped anode. The way droplets form on the end of the wire can be studied as well as their behaviour in flight (Fig. 1). For this work and other projects the association has recently acquired a high-speed cine camera, which will be indispensable.

Other work aimed at a better understanding of the gas-metal reactions which take place in the arc envelope has just been started. The relationship between arc atmosphere and the absorption and retention of gases by the weld pool is being studied using a small button of weld metal melted in a water-cooled crucible by a tungsten arc.

### Properties and Microstructure of Mild-steel Weld Metal

The interesting fact that mild-steel weld metal often has a higher yield point and yield-ultimate ratio than might be expected from its composition was mentioned in last year's report. Although it was thought at first that a fine dispersion of non-



*Magnification 30*

FIG. 2.—THE UNETCHED SURFACE OF A 0.04 PER CENT. CARBON STEEL SPECIMEN WHICH HAS BEEN MELTED UNDER AN ARGON SHIELD AND SUBSEQUENTLY ALLOWED TO COOL. THE RADIAL CORRUGATIONS ARE DUE TO CELLULAR SEGREGATION ASSOCIATED WITH CONSTITUTIONAL SUPER-COOLING. THE GRAIN BOUNDARIES VISIBLE ARE THOSE OF THE AUSTENITE GRAINS AND ARE VISIBLE BECAUSE OF THE THERMAL ETCHING OCCURRING IN THE SPECIMEN. THE ORIGINAL RADIUS OF THIS MELTED SPOT WAS 2 MM.

metallic inclusions, or a precipitate, might be responsible for these observations, the immediate results of the present investigation indicated grain size as the most important factor. Weld metals deposited by processes giving high cooling rates, such as metal-arc welding, have a very fine grain size and high yield points and yield-ultimate ratios. Other processes, such as oxy-acetylene welding, and atomic-hydrogen welding, in which the weld metal is cooled more slowly, give larger grains and a lower yield stress. Prolonged heat treatment of the high yield weld metals at high temperatures to enlarge the grain size produced a reduction of the yield stress.

Although the immediate results of the investigation show a strong connection between yield strength and grain size, the probability of a precipitate also influencing properties is not being neglected. Such a precipitate, believed to be oxide, has been observed under the electron microscope by Irvine and Pickering. In the association's laboratories attempts are being made to discover the nature of this precipitate in welds and the conditions of its formation and growth. Weld metal deposited at various cooling rates will be subjected to a range of ageing treatments at up to 600 deg. C. The recently installed electron microscope will then be used to study the microstructure and behaviour of the precipitate, and subsequently it is hoped to correlate microstructure with both tensile and impact properties.

### Heat-affected Zone Studies

When a weld is made in any material the heat-affected zone is subjected to a range of thermal treatments which result in complex metallurgical changes. Since these can have a marked effect on the properties of the joint it is important that more should be known about their mechanism. Until recently, using conventional methods of examination it has only been possible to examine the final product in the heat-affected zone and to infer, from the appearance of similar material, what the structure looked like before welding.

Using a variation of a hot stage technique developed by Calvo and others in the association's laboratories, it is now possible to examine a particular feature of a structure before and after thermal cycling, and even to observe the changes taking place during the treatment (Fig. 2). The technique uses a thin disc of the material under test which is polished to a micro finish on one side. This side is under observation by a microscope and is flushed with argon. The reverse side is heated by an argon tungsten arc until a weld pool is established which just penetrates the polished surface. On cutting off the current to the arc the specimen cools by conduction to the water-cooled jig in which it is held. A complete range of thermal cycles with maximum temperatures from solidus down to room temperature is therefore obtained. Variations in time of heating and specimen size permit a wide range of cooling rates to be obtained. Detailed observations can be made, for example, of the solution of an individual pearlite grain and its subsequent transformation through austenite to martensite.

With special financial support from the Central Electricity Generating Board, this technique will be used to study the effect of welding on the microstructure of ferritic and austenitic creep-resisting steels.

### Advisory Service

In addition to its outline of the general programme, the report deals with the ever-increasing number of problems posed by members. In an expanding industry, using new materials and techniques to closer tolerances than ever before, it is inevitable that problems will multiply. Conscious not only of the need to meet these demands as speedily as possible, but to make available the results of general research without delay, the association has considerably strengthened its liaison and advisory services. A full-time design staff is now working directly with members' own personnel in producing designs specifically for welding, while, among other things, a bi-monthly bulletin has been introduced to give notice of the association's work in all fields.

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## *New Equipment for GKN Research*

MANUFACTURED by the Cambridge Instrument Company, Limited, a scanning electron probe X-ray microanalyzer just installed by the GKN Group Research Laboratory (the central research and development organization for the Guest Keen & Nettlefolds group of companies) is only the fourth commercial instrument of this type to be installed in this country. Other installations are at the Atomic Weapons Research Establishment at Aldermaston, Sheffield University, and the Thornton Research Centre.

The GKN installation follows the recent acquisition of a Vickers EM6 electron microscope. This equipment will provide powerful support for a programme of basic research designed to improve and to widen the range of properties available in steel and steel products manufactured in the group.

One such project being carried out under a Ministry of Aviation contract concerns the development of a high-tensile weldable steel for rocket casings. Other projects include an investigation into the sources of non-metallic inclusions and a study of segregation during the solidification of steel and the means by which it may be overcome.

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A REVISED EDITION of part 1 of the "'Terylene' Industrial Buyers' Guide," which deals with reinforced rubber and plastic products, has been issued by Imperial Chemical Industries, Limited, Fibres Division, Hookstone Road, Harrogate (Yorks).

# Pig-iron and Steel Production

IN the following United Kingdom pig-iron and steel statistics, issued jointly by the Iron and Steel Board and the British Iron and Steel Federation, Table 1 gives the production of pig-iron and ferro-alloys and the number of furnaces in blast in August. Table 2 gives the production of steel ingots and castings in August and Table 3 gives details of finished steel in July last. Activities of the industry are summarized in Table 4.

TABLE 1.—*Weekly Average Production of Pig-iron and Ferro-alloys in August*, 1960. (*Thousands of tons.*)

| District. | Furnaces in blast. | Hematite. | Basic. | Foundry. | Forge. | Ferro-alloys. | Total. |
|---|---|---|---|---|---|---|---|
| Derbys, Leics, Notts, Northants, and Essex | 20 | — | 31.6 | 18.1 | 0.1 | — | 49.8 |
| Lancs (excl. N.-W. Coast), Denbighs, Flints, and Ches. | 7 | — | 22.9 | — | — | 1.6 | 24.5 |
| Yorks (excl. N.-E. Coast and Sheffield) | — | — | — | — | — | — | — |
| Lincolnshire | 10 | — | 45.3 | — | — | — | 45.3 |
| North-East Coast | 18 | 2.4 | 59.3 | — | — | 1.3 | 63.0 |
| Scotland | 7 | 0.6 | 22.9 | 1.3 | — | — | 24.8 |
| Staffs, Shrops, Worcs, and Warwicks | 5 | — | 11.1 | 1.0 | — | — | 12.1 |
| S. Wales and Monmouthshire | 9 | 1.5 | 51.5 | — | — | — | 53.0 |
| Sheffield | 2 | — | 3.2 | — | — | — | 3.2 |
| North-West Coast | 7 | 13.8 | — | 0.8 | — | 1.1 | 15.7 |
| Total | 85 | 18.3 | 247.8 | 21.2 | 0.1 | 4.0 | 291.4 |
| July, 1960 | 84 | 23.0 | 237.5 | 24.2 | 0.1 | 4.1 | 288.9 |
| August, 1959 | 74 | 15.6 | 179.8 | 20.5 | 0.7 | 3.0 | 219.6 |

TABLE 3.—*Average Weekly Deliveries of New Non-alloy and Alloy Finished Steel.* (*Thousands of Tons.*)

| Product. | 1958. | 1959. | 1959. | 1960. | |
|---|---|---|---|---|---|
| | | | July. | June.* | July. |
| *Non-alloy steel:* | | | | | |
| Ingots, blooms, billets, and slabs‡ | 4.6 | 5.1 | 4.2 | 5.3 | 3.7 |
| Heavy rails | 10.2 | 6.8 | 5.7 | 8.4 | 7.3 |
| Sleepers | 1.2 | 0.6 | 0.1 | 0.6 | 0.7 |
| Fishplates and soleplates | 0.7 | 0.4 | 0.5 | 0.6 | 0.5 |
| Plates, 3 mm. thick and over: | | | | | |
| (i) Over ⅛ in. thick | 29.6 | 24.8 | 16.0 | 29.3 | 18.3 |
| (ii) Under ⅛ in. | 17.7 | 18.3 | 16.2 | 21.3 | 17.3 |
| Other heavy prods. | 41.8 | 41.2 | 28.5 | 53.1 | 42.4 |
| Ferro-concrete bars | 7.6 | 9.6 | 10.5 | 12.6 | 10.7 |
| Wire rods | 21.5 | 23.5 | 17.8 | 29.1 | 20.4 |
| Arches, etc. | 8.6 | 7.8 | 5.7 | 8.4 | 6.5 |
| Other light sections | 29.1 | 33.0 | 26.6 | 40.7 | 32.2 |
| Bright steel bars | 6.2 | 7.6 | 6.6 | 9.4 | 9.0 |
| Hot-rolled strip | 22.6 | 27.4 | 23.3 | 33.9 | 27.4 |
| Cold-rolled strip | 7.0 | 8.0 | 7.1 | 10.0 | 8.7 |
| Sheets, incl. coated: | | | | | |
| (i) Hot rolled | 10.6 | 11.8 | 11.2 | 12.8 | 11.0 |
| (ii) Cold reduced | 31.1 | 35.2 | 29.0 | 39.5 | 36.4 |
| Tinplate: | | | | | |
| (i) Hot dipped | 8.4 | 7.7 | 8.6 | 8.0 | 7.3 |
| (ii) Electrolytic | 10.3 | 13.2 | 15.2 | 14.4 | 13.8 |
| Blackplate | 0.8 | 0.7 | 0.9 | 0.9 | 0.8 |
| Tubes up to 16 in. | 19.0 | 20.6 | 19.0 | 24.6 | 22.4 |
| Tube fittings, etc. | 0.4 | 0.4 | 0.3 | 0.4 | 0.3 |
| Tyres, wheels, and axles | 4.5 | 2.4 | 1.5 | 2.2 | 2.0 |
| Forgings (excl. drop) | 2.6 | 2.1 | 1.9 | 2.1 | 2.0 |
| Steel castings | 4.2 | 3.6 | 3.0 | 4.2 | 3.3 |
| Tool steel | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Total | 300.5 | 312.0 | 259.6 | 372.0 | 304.6 |
| *Alloy steel* | 16.1 | 18.2 | 15.1 | 21.8 | 18.3 |
| Total deliveries from UK production† | 316.6 | 330.2 | 274.7 | 393.8 | 322.9 |
| *Add:* Imported finished steel | 7.0 | 7.1 | 8.0 | 30.4 | 38.9 |
| | 323.6 | 337.3 | 282.7 | 424.2 | 361.8 |
| *Deduct:* Intra-industry conversion§ | 41.2 | 47.6 | 38.5 | 57.4 | 46.0 |
| Total new material | 282.4 | 289.7 | 244.2 | 366.8 | 315.8 |

† Includes finished steel made from imported ingots and semis.
‡ Other than for conversion into any other form of steel listed.
§ Material for conversion into other products also listed in this table.

TABLE 2.—*Weekly Average Production of Steel Ingots and Castings in August*, 1960. (*Thousands of Tons.*)

| District. | Open-hearth. | | Bessemer. | Electric. | All other. | Total. | | Total ingots and castings. |
|---|---|---|---|---|---|---|---|---|
| | Acid. | Basic. | | | | Ingots. | Castings. | |
| Derby, Leics, Notts, Northants, and Essex | — | 4.8 | 15.7 (basic) | 2.5 | 0.1 | 21.8 | 1.3 | 23.1 |
| Lancs (excl. N.-W. Coast), Denbighs, Flints, and Cheshire | 0.6 | 36.9 | — | 3.2 | 0.4 | 39.9 | 1.2 | 40.0 |
| Yorkshire (excl. N.-E. Coast and Sheffield) | | | | | | | | 1.1 |
| Lincolnshire | — | 49.1 | — | — | 0.1 | 49.1 | 0.1 | 49.2 |
| North-East Coast | 0.6 | 78.8 | — | 1.3 | 0.3 | 79.4 | 1.6 | 81.0 |
| Scotland | 1.1 | 46.9 | — | 2.8 | — | 49.0 | 1.8 | 50.8 |
| Staffs, Shrops, Worcs, and Warwicks | — | 24.4 | — | 3.5 | 0.6 | 26.9 | 1.6 | 28.5 |
| South Wales and Monmouthshire | 1.1 | 79.5 | 14.7 (basic) | 0.6 | 0.1 | 95.6 | 0.4 | 96.0 |
| Sheffield (incl. small tonnage in Manchester) | 6.5 | 29.9 | — | 11.5 | 0.2 | 46.3 | 1.8 | 48.1 |
| North-West Coast | — | — | 4.4 (acid) | 0.7 | — | 5.0 | 0.1 | 5.1 |
| Total | 9.9 | 350.3 | 34.8 | 26.1 | 1.8 | 413.0 | 9.9 | 422.9 |
| July, 1960 | 9.6 | 317.6 | 36.7 | 25.7 | 1.8 | 382.6 | 8.8 | 391.4 |
| August, 1959 | 6.9 | 284.9 | 24.1 | 19.6 | 1.6 | 329.4 | 7.7 | 337.1 |

TABLE 4.—*Iron and Steel Index and General Summary of Pig-iron and Steel Production.* (*Weekly Average in Thousands of Tons.*)

| Period. | B.O.T. Price Index, 1938 = 100. | | | Iron-ore output. | Imported ore used. | Coke sent to blast-furnaces. | Pig-iron, ferro-alloys prod. | Scrap used in steel prod. | Steel (incl. alloy). | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Iron and steel. | Coal. | Basic materials§ | | | | | | Imports.† | Prod. ingots, castings. | Delivrs. finished steel. | Stocks.‡ |
| 1958 | 343 | 503 | 478 | 276 | 262 | 227 | 245 | 196 | 9 | 369 | 284 | 2,242 |
| 1959 | 340 | 497 | 477 | 286 | 244 | 210 | 242 | 208 | 7 | 388 | 291 | 2,244 |
| 1960—May | 338 | 483 | 488 | 337 | 317 | 261 | 299 | 252 | 27 | 475 | 393 | 2,248 |
| June* | 338 | 483 | 488 | 297 | 314 | 261 | 295 | 247 | 38 | 466 | 368 | 2,311 |
| July | 339 | 483 | 482 | 302 | 305 | 261 | 289 | 194 | 41 | 391 | 317 | 2,427 |
| Aug.* | 339 | 483 | 477 | 321 | 296 | 255 | 291 | 214 | 32 | 423 | 310 | 2,648 |

* Months contain five weeks, all tables.
† Weekly average of calendar month.
‡ Stocks, ingots, semi-finished and finished steel, at the end of the years and months shown.
§ Used in non-food manufacturing industries.

# THE BURDEN OF MANAGEMENT

## *Presidential Address to Lancashire Colliery Managers*

By G. W. SANDERS, M.I.M.E., M.B.I.M.*

*In the mining industry, as in other walks of life, the burden of management is no new conception. Contemplation of the contemporary scene in this industry would seem to indicate that, while much has to be done to improve the conditions of workers of all grades, the lot of the manager has seldom been effectively improved. In his address to the Lancashire Branch of the National Association of Colliery Managers on September 28, 1960, the new president urges the need for managerial efficiency to meet the challenge of competition from other forms of primary energy.*

BURDEN of management in the mining industry has been subject to violent changes during the last 20 years. Following the severe strain of the war period came the tremendous upheaval of nationalization, conceived with the idea that in the then foreseeable future coal would be scarce and that the industry would perform an indispensable public service. Selling, it was thought, would not be a primary requirement; distribution would be the most the customer would expect, and therefore it was not considered necessary to protect or enhance the selling reputation of the industry.

Since 1957 we have seen another convulsion. Demand has fallen at an alarming rate, competition from other forms of primary energy has become fierce and unrelenting, and an extremely large, centralized, publicly owned undertaking is being forced by the pressure of inexorable events to fight for its very existence in the ruthless climate of business conditions.

### Today's Major Problem

In a large public service accountable to Parliament and its Ministers, political considerations, the "public interest," the striving to avoid public or Press criticism and the desire for uniformity, all result in the formation of myriad protective "rules," and in such a climate the end tends to be swallowed in the morass of means.

The major problem facing our industry today is undoubtedly the travail that must inevitably result from the need to change from a relatively slow-moving, politically sensitive, centralized public service to a virile, quick-thinking-and-acting business concern, that can rapidly change and adapt its course as time and tide dictate. It is the need for these further changes, and the burden that they will create for management, particularly in Lancashire, that is the theme of this address.

In so far as one can assess the situation, and I readily admit how unreliable is the information on which to make such an assessment, it would appear that the inroads made by other forms of energy in our markets are gradually being offset by our slowly developing publicity campaign—together with the growth of industrial activity and consequent increase in energy consumption. For the first half of this year, although oil consumption is reported to be up by some 18.7 per cent. compared with last year, coal sales in the first 32 weeks are also up by almost 3 per cent. It would seem, therefore, that the current aim must be the stabilizing of the mining industry close to its present level of output. It is clear that even to do this will call for tremendous efforts, as competition will become even more fierce; the mining fraternity, like all others, will justly expect ever-improving conditions of employment; and coal seams do not become any easier to mine. In the longer term we face the prospect of a slow, but certain, development of nuclear energy into another important competitor to coal.

In Lancashire we are also virtually in competition with the more favoured Midlands and Yorkshire coalfields. The conurbation of south-west Lancashire provides a far larger market than the Lancashire coalfield can satisfy, and if it is found to be more profitable for the National Coal Board to put coal into Lancashire rather than mine it there, then business considerations cannot be disregarded, and Lancashire is bound to find the going hard. Further, the severe loss of manpower in Lancashire is seriously affecting output and, therefore, income, and making the achieving of financial balance still more difficult.

That we shall shortly witness changes in the national structure and control of our industry seems very likely, and such changes as may be instituted are bound to affect management at lower levels. Nevertheless, while we cannot at present usefully crystal-gaze in that sphere, at least we can take a look at what confronts us at the operational level and see what we can do to clarify our problems and take action to meet them. In this

* Production manager, No. 3 (St. Helens) Area, North-Western Divisional Coal Board.

connection it is interesting to observe what is happening in Europe. With frontiers that are no more than marks on a map, Common Market conditions becoming ever more operative, and the dumping of coal from Iron Curtain sources, competing for the available solid fuel markets is really severe.

Already, the less efficient producers in Belgium have gone out, Germany is producing from fewer mines, France is concentrating, and the Dutch are pursuing a vigorous policy of internal concentration. The objectives, of course, are common; that of bringing down the costs of production in order to maintain, or increase, the attractiveness of coal to consumers. Perusal of the 1959 accounts of the National Coal Board will show that, of the national costs of production some 75 per cent. was controllable by production management, and that production of deep-mined coal accounted for £806,000,000 of the total income of £851,000,000. Therefore, there can be no doubt that the industry is primarily dependent on the efficiency of its production management.

To maintain the level of sales against increasing competition it is inevitable that the tendency will be for proceeds, and, therefore, income, to fall relatively. Increases such as the recent one will only provide a temporary respite from the general trend. It is equally certain that the growing shortage of labour will enable the mineworkers to regain their bargaining power, and this is bound to exert pressure on costs. Adding spice to the issues are our friends in HM Inspectorate, who are rightly expecting ever higher standards of safety.

### Lack of Technical Specialists

An English mining engineer observing the American mining industry recently commented on the way the industry there has absorbed continually rising costs by concentration of production and intensified supervision and management. If we are to produce coal in Britain at a high efficiency with an engineering precision we must ensure first of all that there are sufficient trained brains available.

It must also be recognized that the process of division of labour is an inevitable concomitant of specialization. There is a great paucity of technical specialists at colliery level, mainly as a result of the rigidity of the present organizational structure, with the result that alongside heavily overburdened management one is compelled to witness the distressing wastage of highly qualified young men who, after up to seven years of extremely expensive training, are leaving the industry because either they feel the future holds nothing for them or they cannot be offered suitable opportunities to use their undoubted talents.

The enormous investment in mechanization cannot possibly yield the results it should unless both brains and technical skill are there, both to devise methods and ensure successful operation. Advancing complexity takes up an increasing proportion of managerial time, thereby weakening the managerial effort in matters of human organization and discipline. And one invariably finds that where management in this sphere is weak, the vacuum so created is filled by strong trade union influences with the frequent result of indiscipline and poor results.

It is no accident that, broadly speaking, the larger collieries are the problem pits from a labour point of view. This is at least partially due to a reluctance to accept that management and technical staffs must constitute a larger proportion of the total work force as collieries grow in size. Particularly does this seem to apply when there are more than 1,000 men employed. Further, the rigidity of our managerial structure often decrees the same staff at a colliery with considerable mining difficulties as at a comparably sized one where the task is easier. It must be realized that what matters most in getting results is the effective managerial time available for the management of economics.

### Physical and Mental Capacity

Managers must endeavour to improve personal efficiency, tone up the organization, increase the effectiveness of managerial effort, and brace themselves to carry the increasing burdens that will fall upon us. At the same time, the board would perform a useful service if it would copy some progressive firms and measure the effectiveness of management at the various levels and in the different coalfields. Such an exercise would at least establish the relative weight of managerial burdens.

In the mining industry, as in other walks of life, the burden of high office is no new conception. Contemplation of the contemporary scene in this industry would seem to indicate that while much has been done to improve the conditions of the worker in all grades, the lot of the manager has seldom been effectively improved. In general it may be said to have worsened both by comparison with the lot of the so-called worker and also by reference to many of its own former standards. One has only to consider such factors as increased mechanization, greater complexities in equipment and operations, more involved scientific and engineering knowledge required, intensified specialization and departmentalization, and many others.

Compare these with the simplification of the tasks of workmen and it will be realized that in the mining industry, as in all other modern productive industries, the movement towards mechanization and automation increases the managerial burden as it lightens that of the worker.

Nowadays, the problem of production starts a long way back from the face, and runs the gauntlet of many discussions on methods, systems, machinery orders and deliveries, capital allocations, statutory exemptions, profitability, and so on, before mechanized pick strikes coal. And even after this long process of getting the water to the

horse results often depend on how willing the horse is to drink!

There can be no doubt that the value of an able manager to the concern he works for is extremely high and such a valuable asset needs preserving in relation to its value. Many managers are concerned that the strain of responsibility under conditions of ever-increasing tempo is resulting in a dramatic deterioration in executive health, particularly during the last decade, mainly resulting from the so-called "stress diseases." It is not unreasonable to suggest that this unfortunate state of affairs stems from ascertainable causes, and that these causes are the burdens which fall on management and which are to a greater or lesser degree peculiar to management. Sooner or later there must be some attention directed to alleviating the malaise caused by the management burden. The present waste of valuable management capacity caused by premature deaths, illness, and early retirements in this industry is costing it dearly and will do more so as time goes by.

### To Think, Manage, and Inspire

There are many burdens or many parts of the same, composite burden, and these can be summed up as being the necessity for management to think, to manage, and to inspire.

The mental process is often one of both posing the questions and finding the answers. Management must therefore find the right questions to ask. This is the way most innovation starts. To do the job properly demands an allocation of time, the assembly of background information, an unbiased spirit of inquiry, a calm and judicial approach, an organization, and the "feel" of a situation. Nothing is quite so futile as wasting time arriving at the right answers to the wrong questions.

One of the board's purposes should be to find ways of helping that inevitably larger number of good managers who perform adequately but under great strain. If ways of relieving this strain can be found, then it may reasonably be assumed that those managers will perform with greater merit over a longer period and with greater comfort.

To manage efficiently the manager must, among other things, have knowledge, experience, the ability to make decisions, and an authority which is instantly recognizable, though never mentioned or displayed. Some of these qualities are the result of thought and training. Some may be immature, unfolding gradually given the appropriate atmosphere or climate of opportunity. Some men have a degree of virility, thrust, and capacity which will not be dimmed in spite of circumstances, discouragement, or even active opposition. To direct operations a manager must have authority.

No manager is fit to discipline others until he has learned to discipline himself. Management is frequently disgusted and frustrated by the indiscipline of the workers in these days. It must be accepted that modern technical developments tend to increase the load on management and ease that of the worker. Also, the social evolution of our times would seem to be leading towards a democracy where the massed political power of the unions will demand an even greater degree of consultation. Nevertheless, unions have to recognize that the freedoms of Western democracy do not mean the licence of the jungle and the right to create chaos by the display of selfishness at the expense of the community.

Management in mining is also becoming ever more comprehensive. As Sir James Bowman cogently said at the 1960 NACM conference: "The colliery manager could not afford to confine himself only to the engineering problems of increasing productive efficiency. The efficiency of the pit could not these days be measured only in its output per manshift but in its cost per ton." Yet, as we are seeing in Lancashire in a very marked manner, a fall in bulk output and therefore in income can wreck the finances of a pit or even of a division, as the fixed costs can rarely be reduced *pro rata* to output. In one Area of Lancashire, due to reducing output, the "break-even" point two years ago was 25 cwt./manshift; this has now risen to 28 cwt. and is rising faster than improvements in productivity and costs can currently be obtained. The managerial burden therefore widens to accept the responsibility, along with marketing department, of ensuring that the customer is satisfied and therefore of sustaining the level of sales.

To do this we must get production costs down. In the main, in the Lancashire coalfield, the output per face is far too low. Granted there are many problems to face, such as heavy gas emissions, severe faulting, awkward takes, steep gradients, in many cases difficult labour relationships, but, even so, there is much we can do. A recent party visiting Holland reported inspecting a face where a phenomenal advance of 33 ft. per day was being obtained in a seam 3 ft. thick with a gradient of 1 in 7 on the line of face. The best result in Lancashire to date is an output of 6,000 tons per week from a face 286 yd. long in a seam 5 ft. thick. This is good, but the average is a long way below this. There is no doubt that we must direct our urgent attention to concentration of output within our pits, which will mean a concentration of managerial and technical attention into much more detailed planning, both from a mining and engineering standpoint.

Amidst all these many and conflicting demands on his time, the colliery manager must never forget that, in the last analysis, men are always more important than things. No matter how adequate are the productive facilities unless the manager has the ability to evoke effort from his staff and operatives all his planning can come to nought.

To inspire others is the essence of true leadership. To enthuse others the manager himself must burn with an enthusiasm which will not be denied. Such enthusiasm is contagious. It is part of the management burden. Management must not grow weary when the going is difficult; must not falter

*(Contd. overleaf)*

# New Hydraulic Loading Shovels

OF the four hydraulic loading shovels to be shown by the Merton Engineering Company, Limited, Faggs Road, Feltham (Middx), at the Public Works Exhibition at Olympia, London, next month, three will be new machines being exhibited for the first time. They are the Merton hydraulic Frontloader 65A, the Merton hydraulic Frontloader 80A. and the Merton Sherman "Universal" digger loader.

The Frontloader 65A, illustrated, is a four-wheel drive front-end shovel with large equal-sized tyres, torque converter, power-shift transmission, power-assisted steering, planetary hub reduction in the axles, and a 1¼-cu. yd. S.A.E.-rated capacity bucket. It is powered by a Ford four-cylinder 61.5-b.h.p. diesel engine and has a lifting capacity of 4,000 lb. and a break-out force at the bucket lip of 10,000 lb. The Frontloader 80A is a more powerful four-wheel drive front-end shovel, powered by a Ford six-cylinder 80-b.h.p. diesel engine. This machine has torque converter, power-shift transmission, power-assisted steering, planetary hub reduction in the axles, and is mounted on 13 by 24 tyres.

Both these new machines are based on the successful hydraulic Frontloader 59 and incorporate the main features of this machine, which include a front-mounted cab for "on-the-top-of-the-job" visibility, double-acting hydraulic rams with semi-automatic "raise" and "float" controls, 45-deg. bucket crowd, and excellent loading reach and height.

NEW MERTON FOUR-WHEEL DRIVE FRONTLOADER 65A.

The Merton Sherman "Universal" digger loader is a version of the hydraulic Frontloader 59. It incorporates the Sherman power digger and is noteworthy for its design, which allows the digger to be carried in a "folded" position within the wheel base. As a result, when used as a loading shovel, the machine is in no way impeded by the rear-mounted digger and can be used with maximum efficiency.

The Merton two-way loader, model 454, also to be shown at Olympia, is stated to be the only four-wheel drive "straight-line" loader available today. It combines good all-round visibility, excellent traction, and fully controlled discharge at front or rear. Direct drive or torque converter are available as alternative transmissions.

## THE BURDEN OF MANAGEMENT

*(Continued from previous page)*

when the objective seems to be obscured; must not hesitate when plans miscarry; must not despair when colleagues and helpers give up; when the workmen bite the hand that is trying to feed them; they must never doubt eventual success, and must under all conditions exude a cheerful and purposeful confidence. To management of that order nothing is impossible.

Managers in Lancashire are living in challenging and stimulating days. Our epoch will leave an indelible mark on the mining industry in this coalfield and its future course depends entirely on our skills as navigators now. We, in these days, have tremendous burdens to carry. We have a right to expect proper help and support from those in supreme authority to enable us to properly discharge our tasks. We have an obligation to be highly efficient and effective in the exercise of our managerial function, and to this end we must each continually and consciously strive to enlarge our capacity. One person we each have to live with is ourselves. Only the satisfaction of a heavy task discharged to the utmost of our ability can produce that inner balance without which the burden of colliery management cannot be tolerably borne.

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**Results of Automation**

The Inland Steel Company reports that its punched card control of a slabbing mill, the first in the United States, has improved quality, uniformity, and production. The mill can roll a 20-ton slab in 1½ min., it is stated.

# *Open Days at the* NATIONAL CHEMICAL LABORATORY

SINCE the National Chemical Laboratory of the Department of Scientific and Industrial Research was reorganized two years ago, when it adopted its present title, there have been considerable changes of emphasis in the research programme. Stressing this last week when he spoke in connection with the three Open Days at the NCL on Wednesday, Thursday, and Friday, the director, Dr. J. S. Anderson, FRS, said that some of the former research projects belonged to the new field of work of the laboratory and were being pursued even more vigorously than before, while activity on other projects had been lessened. He thought that the Open Days would prove of interest as much for the promise of results of the new research programme as for the results already achieved.

Primary objectives of the researches at the NCL now come under four headings:—(1) The extraction and utilization of indigenous raw materials; (2) the determination of fundamental properties of organic and inorganic compounds; (3) the prevention of corrosion of metals; (4) the development and application of new materials.

A selection of the current work is indicated in the following notes.

### Extraction of Metals

Work is in progress in the Extraction of Metals Group on the separation of uranium, beryllium, and gold from low-grade ores and concentrates, and the purification of these extracted metals. A new wing of the laboratory is equipped to carry out all aspects of hydrometallurgical research—crushing, grinding, classification, leaching, filtration, ion-exchange, solvent extraction, and precipitation.

A notable exhibit is a recently developed rotary film contactor for solvent extraction. It is being used for the continuous countercurrent solvent extraction of uranium from an approximately 50 per cent. solids ore pulp leached with sulphuric acid. The principle of the process could be applied to the extraction of metals from other ore slurries.

A new topic being studied in the Extraction of Metals Group is the extraction of beryllium from relatively low-grade ores and concentrates. Methods for the high-temperature activation of beryllium minerals by fusion and quenching are being examined, high-temperature microscopy being used to study the phase changes in molten and glassy systems brought about by various treatments. The recovery of beryllium from solution and the fundamental chemistry underlying the recovery processes are also being studied.

The Inorganic Chemistry Group is engaged on the separation and purification of the rare earth elements, which have specific uses in the manufacture of optical glass and ceramics, and also in the very high degree of purification necessary for elements used in electronics for semi-conductors. The very high purification of semi-conductor materials is being actively pursued by the employment of the "zone-refining technique."

Precise information on the properties of pure chemicals plays an important part in industry for the design of new chemical plant, and a major commitment of the laboratory is embodied in the work of the Chemical Thermodynamics Group which is conducting a systematic programme to secure this knowledge. Among the fundamental properties measured may be listed specific heats of liquids and vapours, critical temperatures and pressures, heats of combustion, and spectroscopic data.

Metallic corrosion, which costs this country an estimated £600,000,000 per year, is pre-eminently one of those problems with a wide general relevance to many industries, and especially suitable for the programme of the National Chemical Laboratory. Most of the current work being undertaken by the Corrosion Group is concerned with the corrosion of iron and steel and falls under three main headings:—The occurrence and prevention of corrosion by water and aqueous solutions; the oxidation and corrosion of iron in air; and corrosion of metal buried in soils, or exposed to polluted waters, which proves to be largely a microbiological problem. Fruitful advances in all these aspects of the subject are largely bound up with a better fundamental understanding of the mechanism of the processes concerned.

One new item shown concerns the measurements of corrosion rates in water at temperatures up to 200 deg. C. These determinations will later be extended to higher temperatures. The continuation of an investigation of the influence of water flow speed and temperature on corrosion in circulating systems is also shown.

A second noteworthy development is a study, by electrochemical and radiotracer methods, of the mechanism whereby certain anions—chromate, benzoate, nitrite, etc.—confer protection from

corrosion in neutral solutions and so act as inhibitors.

This work has been largely concerned with the adsorption of inhibitive anions, which is regarded as the necessary first step in inhibition. It is suggested that adsorption occurs only if the potential of the metal is above the so-called zero charge potential. Tests with steel rusting in chloride solutions have confirmed that corrosion is not inhibited unless the potential of the steel reaches a certain critical value before or after the addition of a non-oxidizing inhibitor. This potential can be produced by aeration of the solution, by the addition of an oxidizing agent, by anodic polarization of the steel, etc. The work has a practical application in that protection of steel already rusting, not normally possible with a non-oxidizing inhibitor, might be achieved if the potential of the metal could be temporarily raised by any of the methods indicated.

Several new developments were shown at the Open Days, arising from the work of the Underground and Microbiological Section of the Corrosion Group on the corrosion of metals by sulphate-reducing bacteria. Methods were shown for the isolation, maintenance, and preservation of pure cultures of the organisms. The mechanism of the corrosion process is being investigated by a study of the polarization behaviour of steel in pure cultures of the bacteria and the effect on corrosion rate of different strains of organisms is being determined by weight-loss experiments in semi-continuous culture conditions. Results of these experiments were shown. Attempts are being made to correlate the corrosion behaviour with the fundamental biochemistry of the bacteria.

# *Book Reviews*

**Ergonomics of Automation.** By A. T. Welford. **Automation and Skill.** By Dr. E. R. F. W. Crossman. HM Stationery Office, York House, Kingsway, London, W.C.2. 3s. 6d. each.

CARRIED out under the direction of Mr. A. T. Welford, a study of the human implications of automation recently sponsored by the Department of Scientific and Industrial Research included a survey by Dr. E. R. F. W. Crossman of existing practice in industry and a critical appraisal by Miss H. M. Clay and Mr. Welford of recent research. The two booklets now published together constitute the final report of this study.

The booklets are issued in the DSIR's "Problems of Progress in Industry" series.

Mr. Welford's booklet discusses research relevant to the problems of the human operator in an automatic plant, with special emphasis on the design of equipment. The author reaches the conclusion that the outstanding lesson that emerges from the studies done so far in the field of ergonomics is that the design of machine tools and other equipment according to sound engineering principles is not enough to ensure that their full potentialities will be realized. The machine and its operator inevitably form a single system in which the characteristics of both contribute significantly to the performance of the whole. Full account must, therefore, be taken of human abilities and limitations in the design of these systems if they are to operate to full advantage. The human characteristics concerned include not only the basic capacities of the human body and brain but also the effects of individual and social experience, the aims, ambitions, hopes, and fears that a man brings to any task he performs.

While this is to some extent true of all industrial machinery, Mr. Welford maintains that it is particularly important in relation to the design of automatic plant. Although automatic methods may reduce the immediate part played by human operators, they leave human beings in certain key positions in which the mental load upon them may be heavy and the effects of their actions far-reaching. The human link in the system thus becomes more and not less important than it was before.

In his account of the industrial survey, Dr. Crossman discusses the skills required of human operators in highly mechanized and automatic plants, as well as problems of selection and training.

**Trade Union Law.** By Norman Arthur Citrine, LL.B. (Lond.). Second edition. Stevens & Sons, Limited, 11, New Fetter Lane, London, E.C.4. £5 5s.

IT is 10 years since the first edition of this work was published, and during that period it has become to be generally accepted as a standard work. Trade unions and the trade union movement in the last decade have continued to develop, both in the dynamic role which they fulfil in our national life and in the extent of their membership. The law also continues to develop.

In writing this work the author has sought to cater for the needs of the lawyer and the layman, including trade union officers. An endeavour, so far as possible, has been made to employ simple language, and all the legal and Latin terms used are explained in a glossary. The major part of the book is essentially a commentary on the Trade Union Acts, but it will, the author hopes, be found to deal with every facet of the law relating to trade unions. While those who already possess a knowledge of the law may refer direct to the notes on the appropriate sections of the Acts in Parts 2 and 3 or by way of the extensive index, the newcomer and the student are advised to read Part 1 before embarking on the remainder of the book, because it deals briefly with the history of the law and discusses the two legal doctrines which are fundamental to the subject—restraint of trade and conspiracy.

A useful feature is that, for the benefit of the professional adviser and the trade union official, the author has sought, wherever possible, to give practical guidance, particularly on the drafting of rules. Further, to avoid one's eyes being drawn from the text unnecessarily by footnotes, those which are merely references are given in light type. Heavy type will indicate to the reader that a particular footnote contains some reading matter of importance which cannot conveniently be included in the text. It is explained that, in the interests of economy, the appendices have been reduced by the omission of those statutes which are sufficiently set out in the text.

## NEWPORT AND DISTRICT METALLURGICAL SOCIETY

# CIVIL ENGINEERING HISTORY

## Vast Undertaking of the Spencer Steelworks

WHEN the decision was taken to build the Spencer Steelworks at Llanwern, near Newport (Mon), a train of events was set in motion which resulted in the placing of the largest civil engineering contract ever dealt with in Great Britain by one firm. This was stated by Mr. Edward H. Ramage, a director of Sir Robert MacAlpine & Company (South Wales), Limited, who was chief guest at the annual dinner of the Newport and District Metallurgical Society last Friday.

"Let there be no doubt in anyone's mind—civil engineering history is being made at Newport at this time," he added. His firm was carrying out £2,000,000 worth of work per month at Llanwern and this meant that all previous records in Great Britain had been more than doubled. To this must be added the value of work being carried out by other contractors directly employed by Richard Thomas & Baldwins, Limited.

Describing the problems facing everyone connected with the Spencer Works, Mr. Ramage said that originally it was intended to build over a period of three and a half years, but considerable delay ensued before the Government's decision to locate the works at Newport.

### Effort Nearly Doubled

Further delays meant late access on to the main site, while finally the Government requested RTB to complete the work 12 months earlier than had been originally planned. The resultant effort required from RTB engineers, their consultants and contractors, had been nearly doubled from what was already a tight schedule. The site was roughly oblong in shape and covered about 1,700 acres, being three and a half miles long by three quarters of a mile wide. The first objective was to open up lines of communication by constructing roads and conveying filling to various constructional areas.

Dealing with the filling problem, Mr. Ramage said he felt it was time this was put in proper perspective in the public mind. The reduced construction time precluded the use of sand filling by means of pumping from the river Usk and dry filling had to be substituted. At the same time, the quantities required were doubled and they were faced with producing 7,500,000 cu. yd., all of which had to be imported from a radius up to 25 miles from the site. By way of contrast, the filling of the site of the Steel Company of Wales's contract at Abbey demanded only 4,500,000 cu. yd. over double the period and the whole of the material was obtained from the company's own site.

For various reasons railway-borne material for Llanwern was out of the question and the problem became one of balancing sufficient intake against the saturation of traffic in the Newport district, with its already overloaded single bridge over the river Usk. "By co-operating with the police authorities, without whose help the problem could not have been scolved, we reached a stage where a lorry was coming or going from the site on an average of one every six seconds throughout the day," Mr. Ramage added.

There had been complaints of reckless driving by the lorry drivers, but their record could be compared favourably with that of other road users. More than 1,000 drivers had been employed and so far they had covered more than 40,000,000 miles. Yet only two fatalities could be attributed to these lorry drivers.

Mr. Ramage then gave some interesting statistics about the Llanwern building project. A total of 85,000 concrete piles was required, of which over 60,000 had been driven in six months. Of 700,000 cu. yd. of concrete required, nearly 200,000 cu. yd. had already been poured and cement was being brought from Kent by train augmented by road supplies from Rugby and Aberthaw. Reinforcement for the works, supplied by the Whitehead Iron & Steel Company, Limited, would total 35,000 tons over 16 months.

Nearly 20 miles of permanent roads had been laid in the past 12 months and another 20 miles of temporary roads for access to the construction areas. Of the 40 miles of railway track to be laid about half had been completed. A 100,000,000-gal. reservoir was being constructed involving the removal of nearly 1,500,000 cu. yd. of excavation and the placing of 55,000 cu. yd. of concrete. Over 10,000,000 bricks had been ordered for ancillary buildings.

Mr. Ramage added that one could wish for a more realistic approach by the Ministerial departments concerned in connection with the road programme around Newport with a second river bridge the top priority.

Mr. G. H. Latham, president of the society, said there was nowhere more appropriate than

Newport to speak about the future development of the British steel industry. "The very fact that the Spencer Works is being established literally on a greenfield site provides a wonderful opportunity, which is being grasped with both hands, for starting with a clean slate and assiduously pursuing the utmost economy in the use of equipment, materials, and manpower. The Spencer Works can also conveniently skip the Bessemer and open-hearth ages and plunge straight into the brave new LD world," he said.

Mr. Latham then outlined the effect of the steel industry's development programme on South Wales and Monmouthshire, mentioning that capital expenditure on development in this area since the war had been far greater than that of any of the other nine steelmaking districts in the UK. Nationally it was evident, he said, that certain striking changes were taking place in the industry. A potential capacity of 34,000,000 tons in 1965, compared with the expected output this year of 24,000,000 tons, was already in sight. This should provide an appreciable margin in excess of the likely requirement, not only in terms of ingot steel, but also of the various finished products.

"Indeed the wheel has turned full circle, and it looks as if we shall again quite soon be faced with the problem of securing the benefits of private competition and yet at the same time ensuring the adequate loading of efficient plant to ensure the minimum cost of production," he added.

Thanks to the new availability of tonnage oxygen at a lower cost, there was at least an appreciable challenge to the open-hearth process. Indeed, by 1965 there would be installed no less than 4,500,000 tons' capacity to process steel by the LD or Kaldo processes, representing a rise from nil in 1959 to 13 per cent. of total potential production in 1965. At the same time, an increase of potential electric steel production from 1,400,000 tons to 4,000,000 tons, or 12 per cent. of the total in 1965, was planned.

# £70,000,000 STEEL MILL FOR BRAZIL

ONE of Latin America's largest industrial projects, a new integrated steel mill in Brazil, is now in the course of construction and is due to go into operation in 1962. Companhia Siderurgica Paulista—COSIPA—is building the mill at Piacaguera, in the state of Sao Paulo, to answer increasing demands for steel from Brazilian manufacturers. Initially, the mill will produce 600,000 tons of sheets and plates a year, starting in 1962 when rolling equipment has been installed. Full capacity of 2,500,000 tons of finished products will be achieved in 1967. COSIPA's steelmaking facilities will be in operation at that time.

Even after the mill reaches capacity, Brazil still expects a steel deficit estimated at between 400,000 and 500,000 tons. This will be made up by imports.

At the outset, COSIPA will process semi-finished steel from Companhia Siderurgica Nacional, a leading Brazilian steel mill. When the mill is fully integrated, it will process raw material from an "iron mountain" in the neighbouring state of Minas Geraes.

COSIPA is installing a 44-in. slabbing mill, a 110-in. reversing plate mill, a 66-in. continuous hot strip finishing mill, a 66-in. three-stand tandem cold mill, a 66-in. four-high temper mill, and a 66-in. two-high skin pass mill. In the three process lines are to be a 60-in. heavy-gauge upcut shear line for hot-rolled sheet, a 60-in. cold-rolled shearing line, and a continuous pickle line.

COSIPA steel will be used in the manufacture of ships, railway vehicles, motor trucks, cars, and domestic appliances. Four major British and American manufacturers are producing passenger cars, trucks, and engines in Brazil. The complete plant programme will cost over £70,000,000, of which more than half will be spent for imported equipment. Mechanical apparatus for the mill is being supplied by several European manufacturers. Consulting engineers are Kaiser Engineers, a division of the Henry J. Kaiser Company, of Oakland, California.

The COSIPA plant is being established in a strategic location. In addition to being close to a rich source of raw material, the site is linked to Sao Paulo, Brazil's largest city, by rail, a new super-highway, and an oil pipeline. Most of the 10,000 workers the plant will eventually employ, however, will commute from the port of Santos, 10 minutes from the plant. The site chosen for the mill is in itself an indication of the changes occurring in Brazil. The area until recently was the location of a banana plantation.

## *Light Alloys Striking Rusty Steel*

IT is generally accepted that the sparking from impact between light alloys and rusty steel arises from a thermite reaction.

SMRE Research Report, No. 190, by Dr. D. Rae, issued by the Safety in Mines Research Establishment, Sheffield (price 2s. 3d.), states that if, in an apparatus developed for delivering controlled glancing blows in a gas mixture, a thermite mixture is made by smearing light alloy on a rusted steel plate, sparks which ignite methane air are readily produced by striking the smear with steel, brass, or aluminium, but not with zinc. This is because the striker puts a smear of itself, at a temperatue limited by its melting point, over the light alloy smear and the rust, and zinc has a relatively low melting point.

The minimum velocity at which a ¼-lb. striker of brass or steel will cause gas ignition, 2.6 m./sec., is slower than usual hammer velocities.

# Oxygen Converter Capacity in US

## *GROWTH RATE OUTSTRIPPING OTHER PROCESSES*

*"It pays to have basic oxygen if you're in the steelmaking business," says an anonymous writer in the August 29, 1960, issue of Steel. While the national (United States) steel operating rate has been going downhill, dipping to as low as 50 per cent. of capacity in July, oxygen converters have been running above 80 per cent. of capacity in the whole of the year with the exception of February.*

IT is not hard to find reasons for the paradox:—Producers claim the process is significantly more efficient than other methods of making steel. Because oxygen converters use a high percentage of hot metal, producers prefer to keep them in operation so that they can avoid costly shutdowns at blast furnaces, coke ovens, and mines.

Oxygen converter output is generally used to make the common, low-carbon variety of steels that are processed into flat-rolled products. It is no problem to switch production from less efficient furnaces to the converters. They are versatile enough to produce some of the alloys, one steelmaker even using them to make stainless steel. This enables producers to fill gaps in schedules.

"The furnaces are so new that producers still don't know just how much steel they can make in them. Some are undoubtedly running well above reported capacity figures," comments one oxygen steelmaker.

### Only Four Producers

Only four US producers use the basic-oxygen process:—Kaiser Steel Corporation, McLouth Steel Corporation, Jones & Laughlin Steel Corporation, and Acme Steel Company. Total annual capacity reported by the American Iron and Steel Institute was 4,157,400 net short tons on January 1, 1960—less than 3 per cent. of total steelmaking capacity.

Indications are that the high operating rate will continue. Officials at J&L report they are shoving as much production as they can into the more efficient units and will continue to do so for the remainder of the year.

Acme Steel says that its converters were shut down for four weeks in July and August, but the company has started them up again and will keep them in operation as long as there are enough orders. McLouth Steel reports that its oxygen furnaces are operating at 89 per cent. of capacity and hopes to increase the rate.

The operating rate of basic oxygen plants is expected to advance steadily through the last five months of the year.

Oxygen converter operating rate contrasts sharply with the showing of the other processes during recent months. The open-hearth rate is bound to be fairly close to the total national rate because it accounts for the lion's share—about 85 per cent. of the nation's steelmaking capacity. Electric furnace operations are down because of the fall-off in demand for stainless and the special alloys produced by this process. Bessemer steel is in a gradual decline of several years' standing. It is aggravated by the sharp drop in demand for tubes, which is the biggest user of this type of steel.

The trend toward the basic-oxygen process is gaining momentum. By 1962, there will be at least three more producers Colorado Fuel & Iron Corporation is building two oxygen converters with 100-ton per heat capacity. The National Steel Corporation has announced plans for building two basic-oxygen furnaces rated at 250 tons per heat at its Great Lakes Steel Corporation plant in Detroit. Kaiser Engineers Division of Henry J. Kaiser Company, Oakland, Calif. (exclusive sub-licensor of the LD process in the US) reports that another company will have oxygen steel capacity in another two years. In addition, the company says three or four others are in various stages of planning.

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# Swedish Works to Make Large Calander Rollers

THE Akers Styckebruk ironworks, in Central Sweden, which specializes in cast-iron products, has recently embarked on a large-scale expansion scheme for the purpose of making calander rollers of extra large dimensions. The firm's production of rollers for the paper-making industry has hitherto been limited to a maximum weight of 35 tons; the maximum will now go up to 60 tons.

A new construction hall is to be erected, measuring over 90 ft. in length by 70 ft. in breadth, with a height of 21 ft. It will incorporate a casting pit 30 ft. deep, a low-frequency furnace designed for 1,100 kVA and a charge of 25 tons, and overhead travelling gear with a lifting capacity of 80 tons.

The engineering workshop is being modernized by the addition of a roller grinding machine with roller dimensions of 1,400 mm. dia. by 9,000 mm., already installed, and two lathes—one for 1,600 mm. by 6,500 mm.; the other for 1,600 mm. by 12,000 mm.—and a boring machine with a spindle calibre of 180 mm., which are in process of installation.

The estimated cost of this expansion is close on £500,000.

### Heavy Drifter for

# DEEP HOLE DRILLING

DESIGNED especially for deep hole drilling, a new heavy drifter, the S.L. 160, has been introduced by Holman Bros., Limited, Camborne (Cornwall), and is being exhibited at the Public Works Exhibition at Olympia, London, in November. It has reversible rotation, which considerably assists in the coupling and uncoupling of jointed drill steels.

The " locked-in " shank has long-bearing surfaces on either side of the lugs to maintain good alignment of the drill steel: 1¼-in. round, 1½-in. round, or 1¼-in. hexagon rods can be used with the S.L. 160.

A large-diameter water tube, which permits a good flow of flushing air or water, is ring sealed in the drill shank. This prevents any escape at the shank and ensures that full pressure is maintained right to the drill bit. While rotation is determined by the set of a lever at the back end of the drifter, control of operation and blowing is by a separate cock which can be situated where most convenient to the mode of drilling.

THE NEW HOLMAN HEAVY DRIFTER SHOWN IN A LIGHT ALLOY CRADLE FOR DEEP HOLE DRILLING UNDERGROUND.

The screw fed, cradle-mounted model is driven by the most powerful and compact air motor yet developed by the company—the Mark IV. Besides giving ample power for withdrawing drill steels from depth, its compactness, which reduces overall cradle length, has obvious virtue underground.

The S.L. 160 has a 4-in. bore, and a 3 7/16-in. stroke. Its weight with shank end is 150 lb.

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SPECIFICATION No. 202/1960 issued by the National Coal Board covers three-core and four-core paper-insulated and armoured cables for use up to 660 V, and three-core paper-insulated and armoured cables for use up to 11,000 V with earthed neutral.

# *Exhibition of Historic Books on Mining*

FOURTH in the series of Science Museum exhibitions of historic books which have played a notable part in the development of science and industry will be concerned with rare books dealing with mining, assaying and metallurgy, mining law, and mineralogy. The collection, consisting of books owned by Mr. Robert Annan, is being exhibited from November 15 to December 31 with the co-operation of the president and members of the Institute of Mining and Metallurgy.

Although mining has a long history, written records are extremely scanty and it was not until the early and mid-16th century, when the works of Agricola and others were published, that technical records of mining and ancillary practices became generally available. In medieval times the German miner was pre-eminent, his methods of working the ore deposits and the later treatment of the ore being much superior to those employed elsewhere. It is not surprising, therefore, that many of the rare books in the exhibition are of German origin.

Books published in other countries are also to be shown. Of particular interest is Gabriel Plattes' " Discovery of Subterraneall Treasure " (1639), which, although having little technical merit, was the first work devoted entirely to mining to be printed in English. The oldest work on exhibition is " De Mineralibus " by Albertus Magnus (written about 1260) in the version printed at Padua about 1476 and later at Venice in 1495.

The Science Museum at South Kensington is open daily from 10 a.m. to 6 p.m. (Sundays 2.30 p.m. to 6 p.m.).

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# Harnessing Solar Energy

SOLAR cells, now being used in US satellite and missile programmes to supply power in outer space, are to be manufactured at Oxted (Surrey) by a new company formed jointly by Metal Industries, Limited, and the International Rectifier Corporation, California. This company, International Rectifier Company (Great Britain), Limited, in addition to producing silicon solar cells for any British space research programme that may be undertaken, is also capable of the manufacture of semi-conductors on a large scale.

The efficiency of the conversion of the sun's rays into useful energy by the silicon cell is between 5 and 10 per cent., but 14 per cent. has been reached and 25 per cent. is theoretically obtainable. These efficiencies, although not high, show a marked increase when compared with the selenium cell built in 1876, which had a conversion factor of 0.5 per cent.

The silicon photovoltaic solar energy cell converts photons of light energy into a flow of electrons, *i.e.*, electric current, which can be effectively used for powering experimental transistor radio sets, lighthouse beacons, portable transceivers, and other types of communication equipment.

# *New Literature*

NEW catalogues, booklets, and other publications which have recently been received include those mentioned below. Readers wishing to obtain a copy of any of the publications referred to should apply direct to the address given, at the same time mentioning IRON AND COAL.

MEYNELL & SONS, LIMITED, Montrose Street, Wolverhampton—Full details about the company's glandless valves are contained in catalogue RP 460.

TECALEMIT, LIMITED, Plymouth (Devon)—The company has published a new replacement oil filter element applications brochure (No. 110, issue 25).

FOURWAYS (ENGINEERS), LIMITED, P.O. Box No. 4, Tipton (Staffs)—The company's conveyors, portable and fixed, are designed to meet the requirements of most industries. An illustrated brochure is available.

NATIONAL UNION OF MANUFACTURERS, 6, Holborn Viaduct, London, E.C.1—October issue of the British Manufacturer (2s.) features Northern Ireland and gives useful information on industrial prospects there.

SPRAYED INSULATIONS, LIMITED, 18-40, Thomas Road, London, E.14—"Silbestos" is claimed to be "a most effective and economic answer to any insulation problem." Full details are contained in a new brochure.

BAKER PERKINS, LIMITED, Mineral Processing Division, Blackhorse Road, Letchworth (Herts)—The TBE Bulletin, issued in conjunction with Israel Mining Industries Laboratories, Haifa, reports on a number of investigations carried out on a variety of subjects.

NORTHERN ALUMINIUM COMPANY, LIMITED, Bush House, Aldwych, London, W.C.2—Aluminium News is published by Aluminium, Limited, Montreal, and is an interesting source of information about developments in the aluminium industry in various parts of the world.

MARITIME STORES, LIMITED, 6-8, Forth Street, Liverpool 20—"Marisplice" is an automatic method of splicing preformed wire rope 1 in. to 7 in. circumference and ¼ in. to 2 in. dia. It is not, it is emphasized, a system of clamping. The company has issued an attractive brochure.

MOND NICKEL COMPANY, LIMITED, Thames House, Millbank, London, S.W.1—Abstracts of papers presented at the fifth symposium on "Magnetism and Magnetic Materials," held at Detroit last year, form an interesting feature of the August/September issue of the Nickel Bulletin.

FOUNDRY SERVICES, LIMITED, Drayton Manor, Tamworth (Staffs)—"Porosity in Phosphor Bronze Bearing Due to Dissolved Gas," "The Use of Strainer Cores," and "The Modification of Aluminium-silicon Alloys" are among the subjects of articles in the latest (No. 142) issue of Foseco Foundry Practice.

MAVOR & COULSON, LIMITED, Bridgeton, Glasgow, S.E.—Contents of the autumn issue of the attractive M & C Apprentices' Magazine include photographs and a description of the company's new extension. Other features include an interesting article on the company's punched-card department.

TURNER BROS. ASBESTOS COMPANY, LIMITED, Rochdale (Lancs)—Information relating to natural and synthetic fibre carcases, special-purpose belts, and conventional types of conveyor and elevator belting is contained in a new booklet (No. BA75), which also gives details of the company's vulcanizing service.

STANLEY WORKS (G.B.), LIMITED, Rutland Road, Sheffield 3—A new and revised catalogue (No. 26) of Stanley tools is available. In addition to giving full details of a wide range of tools, the catalogue includes information on the correct use and maintenance of tools and over 100 photographs and instructional drawings.

JOHN HOLROYD & COMPANY, LIMITED, P.O. Box 24, Holfos Works, Rochdale (Lancs)—Holfos catalogue (HC.60) is an amended and slightly enlarged edition of the catalogue published in 1945. A polished production, it gives details of current manufacturing facilities and indicates the more important materials produced by the company.

THE ENGINEERING CENTRE, Stephenson Place, Birmingham 2—October issue of the News Letter is really an open invitation to all likely to be interested to visit "Britain's only permanent engineering exhibition." Details are given of forthcoming meetings and exhibitions, together with an up-to-date list of Engineering Centre exhibitors.

BRITISH COAL UTILIZATION RESEARCH ASSOCIATION, Randalls Road, Leatherhead (Surrey)—The current issue (No. 40, price 2s. 6d.) of the association's Quarterly Gazette contains an article covering the use of high-speed photography in researches calculated to elucidate the mechanism of the grinding of coal and many other interesting features.

BRITISH GEAR MANUFACTURERS' ASSOCIATION, P.O. Box 121, 301, Glossop Road, Sheffield 10—The association's "Buyers' Guide," first published in 1955, has been revised and reprinted. It is designed to assist buyers of gears both at home and oversea by making known the range of products and services which are available from British manufacturers.

BEECHAM BUILDINGS, LIMITED, Shipston-on-Stour (Warwickshire)—Considerable interest was shown in the company's stand at the recent Factory Equipment Exhibition at Belle Vue, Manchester. An office block for Nortons-Tividale, Limited, Tipton (Staffs), and an ironfoundry for Sterling Metals, Limited, Nuneaton (Warwickshire), are among the Beecham buildings illustrated in the company's brochure.

GENERAL ELECTRIC COMPANY, LIMITED, Magnet House, Kingsway, London, W.C.2—The October edition of the quarterly Export Guide, prepared by the company's economic and marketing research unit, is now available. It analyzes the prospects for British exports of 36 product groups to 34 major markets. For the fourth successive quarter, that is, for the whole of 1960, there are no "bad" spots among Britain's major oversea markets.

IMPERIAL CHEMICAL INDUSTRIES, LIMITED, Imperial Chemical House, Millbank, London, S.W.1—ICI's Nobel division is today marketing detonators which go off with almost incredible accuracy—in fact, with a delay of as little as a 25 thousandth of a second. Some of the advantages of blasting with such short delays between explosions are outlined in an article in the October issue of the ICI Magazine (2d.).

NATIONAL COAL BOARD, Hobart House, Grosvenor Place, London, S.W.1—Outlook on Education and Training in the Coal-mining Industry, published

quarterly, sets out to assist in establishing and maintaining good standards of education and training work in the industry by keeping the NCB's officers most directly concerned with this work informed of developments in this field, both within the industry and elsewhere. The autumn number has just been published.

THOS. FIRTH & JOHN BROWN, LIMITED, Atlas Works, Sheffield 4—An elaborate brochure (publication No. 222/1) has been issued on "Forged Steel Rolls." The company claims that, with over half a century of experience in the manufacture of forged steel rolls, it is continuously improving its plant, manufacturing methods, and steel quality and that its rolls are among the finest in the world. The new publication is a first-class guide to the company's products.

SANDVIK SWEDISH STEELS, LIMITED, Manor Lane, Halesowen, Birmingham—"Stainless Steel Tubes" is the title of a new book published by the company and its parent organization, the Sandvik Steel Works Company, Limited, Sweden. Virtually every aspect of the subject is covered in 175 pages. It is well illustrated and provides detailed information on stainless steel grades, manufacturing methods, tempers and finishes, fabrication, and welding. No charge is made for the book.

ARMSTRONG WHITWORTH (METAL INDUSTRIES), LIMITED, Close Works, Gateshead-on-Tyne—September issue of Close-up, which is published quarterly by the company and Jarrow Metal Industries, Limited, is the last number of the magazine to include the name of the Jarrow company, as the Jarrow steelfoundry has changed its name and commenced operating under the name of the parent company. An article on "Some Aspects of Surface Finish" is among the features of this issue.

HENRY WIGGIN & COMPANY, LIMITED, Thames House, Millbank, London, S.W.1—"Some Applications of 'Nimocast' Heat-resisting Alloys" explains briefly the composition and available types of casting in the "Nimocast" series of nickel-chromium alloys. Many of the applications, which are illustrated, are components of British gas-turbine engines, such as turbine-stator blades, rotor blades, discs, and rings. "Inco-Weld 'A'" is designed for the welder of dissimilar metals. For many years it was the general rule that the filler metal should match the higher alloy of the metals being joined. Although this proves satisfactory for some combinations, there are many instances where undesirable deposits have resulted from the filler metal being diluted with the lower alloy base metal. These difficulties are not insurmountable and the publication explains how Inco-Weld "A" electrode and filler wire has been specially designed for joining dissimilar metals.

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### Oversea Trainees in Industry

"Overseas Trainees in United Kingdom Industry," a pamphlet published by the Federation of British Industries, 21, Tothill Street, London, S.W.1, outlines the part which British industry plays in helping oversea technologists to gain practical experience. In a foreword Sir Norman Kipping, director-general of the FBI, writes: "The larger companies already provide much training. I believe the smaller companies, singularly or in co-operation, would do more than hitherto if they had greater knowledge of the need and of the problems involved. The object of this booklet is to provide them with that knowledge, and it sets out to do so by answering many of the questions which industrialists will have in mind."

# Broken Hill Proprietary Developments

FIRST stage of a construction programme to increase production at Whyalla blast furnace, South Australia, has been approved at a cost of £300,000. The Broken Hill Proprietary Company, Limited, has given a progress report on the expenditure of £4,300,000 on projects associated with the proposed Whyalla steelworks. The amount covers 52 separate projects at the Whyalla works. The largest item of expenditure will be £500,000 for standardization of the works' railway system and improvements to inter-works roads. Houses to the value of £240,000 are to be built. There will be extensions to the blast-furnace wharf, installation of a 15,000 kW turbo-alternator, and erection of an electrostatic precipitator at the blast furnace. The alternator will increase capacity of the power house to 30,000 kW.

BHP has given an order worth £500,000 to the Norwegian firm, Elektrokemisk, for a 13,200-kW ferro-manganese furnace with auxiliary equipment. The furnace will be installed in the new ferro-alloy plant to be built at Bell Bay, Tasmania, by Broken Hill's subsidiary, the Tasmanian Electro Metallurgical Company, Pty., Limited. The plant will have an initial output of 26,000 tons a year of high-carbon ferro-manganese.

The comparatively "new" ironstone deposits in Yampi Sound have been developed at a cost of over £1,000,000. The area is held by the two major Australian steel companies in the BHP group, under lease from the State Government. Yampi Sound is 160 miles north-east of Broome in the north of Western Australia. The ore is shipped a distance of approximately 3,000 miles around the coast to Port Kembla and Newcastle. The northern boundary of the Sound is a line of small islands trending west north-west. Important deposits of iron ore occur only on Koolan and Cockatoo islands.

The Yampi ore is a high-grade hematite containing 60 to 68 per cent. iron. Where developed from the hematite quartzites, the ore is hard and massive, and where developed from the schists, it is micaceous, soft, and powdery. The ore is often strongly magnetic and under the microscope is seen to have been formed from magnetite, of which some small remnants remain.

The Yampi ore is very fine and averages about 30 per cent. minus 200 mesh. It has many of the characteristics of a "specular" ore, a large proportion of its hematite being platelets. The presence of a certain amount of koalinite tends to mask the specular nature of the ore; the other gangue mineral present is detrital silica.

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VÖEST, of Austria, will blow in its fifth blast furnace towards the end of the year.

# FLEXIBLE SEAL DOOR

## for Mine Skips and Storage Bunkers

AT the Central Engineering Establishment of the National Coal Board a flexible seal door has been designed by Mr. A. K. Barker, a development engineer, which overcomes the sliding friction inherent in vertical steel-plated guillotine-type doors used on skip containers and horizontal sliding doors fitted to bunkers. It consists of a flexible seal held across a discharge opening by a series of support rollers mounted in a movable carriage frame which can withdraw and replace the seal. One end of the seal is attached to the top edge of the opening and the other, after being inserted between the opening and the support rollers, is lapped around the first support roller and fixed to the movable carriage, which consists of two side plates, joined by tie bolts forming spindles on which the rollers rotate, and is supported under an opening by a set of guide rollers.

As the carriage is retracted the support rollers withdraw from the seal and the now loose seal is peeled away from the opening in the form of a loop, allowing the material to discharge; as it is advanced, the support rollers progressively replace the seal across the opening.

Since the action of withdrawing the support rollers is rotational and the seal peals away from the opening, friction between the door and the material stored is eliminated. The door is easily operated, requiring considerably less power than a conventional sliding door, and overcomes problems of jamming or freezing; it is ideal for fitting to any bunkers containing fine granular material or material of an adhesive nature.

The photograph shows a flexible seal door in its open position, fitted to a 16-ton capacity bunker for storing coal slurry; a similar door has been fitted to a coal washery refuse bunker and both have worked satisfactorily since their installation.

Using a flexible seal door weighing 300 lb. to cover a 2-ft. 6-in. wide by 4-ft. 3-in. vertical opening on a 4-ton capacity skip container standing 16 ft. high, the force required to open the door against a full load was found to be 710 lb. This low power has led to the development of a system for automatic opening and closing of the discharge door of a travelling skip. A small door-operating cylinder is mounted on each skip and is controlled by a panel of valves which are arranged to produce a suitable sequence for automatic operation.

FLEXIBLE STEEL DOOR FITTED TO A 16-TON BUNKER FOR STORING COAL SLURRY.

## Coke Research at Chesterfield

DURING 1959, the first full year of activity at the Coke Research Centre at Chesterfield of the British Coke Research Association, work was begun on almost all sections of the new programme of research which had been formulated by the Programme Working Party and subsequently approved, with minor amendments, by the Research Committee and by the council.

The main objective is the improvement in the quality and yield of metallurgical coke, which accounts for about 40 per cent. of the centre's effort. Other activities include:—Thermal behaviour of coal and the fissuring of coke (11 per cent.); primary structure and reactivity of coke (6 per cent.); micro-structure and mechanical properties of coke (6 per cent.); resistance of beds of coke to the flow of gases (5 per cent.); methods of analysis and measurement (6 per cent.); liquid effluents and atmospheric pollution (5 per cent.); new methods of making blast-furnace coke (3 per cent.); use of oven coke in domestic appliances (3 per cent.).

The work of the British Coke Research Association is outlined in the annual report, which has just been published.

THE MINES DEPARTMENT of Western Australia is considering drilling to prove the iron-ore resources at Wilgie-mia, near Cue.

# Safety Standards for Helmets

FURTHER information is now available about the first meeting of the new technical committee of the International Organization for Standardization (ISO/TC 94) dealing with protective helmets. The meeting was held at British Standards House, 2, Park Street, London, W.1, from October 12 to 14.

The committee, of which the British Standards Institution holds the secretariat, has been set up to prepare international recommendations for the quality and performance of helmets designed for protection against physical injury to the head. More than 40 delegates from Czechoslovakia, Denmark, France, Germany, India, Italy, New Zealand, Pakistan, Poland, the UK, and the USA attended the meeting, at which it was decided to form two working groups, one of which will deal with requirements for industrial helmets, and of which Germany has been appointed the secretariat, and the other, of which the UK has been appointed the secretariat, with requirements for road users' helmets.

Important statistical information about accidents in the UK and USA was exhibited at the meetings, and medical experts made a valuable contribution to the consideration of the areas of the head which it was desirable to protect. It was agreed that the requirements to be covered, with methods of evaluating these rquirements, should include protection against impact and penetration and the ability of the helmet to withstand a degree of heat and moisture without deterioration.

In regard to impact and penetration, there was agreement that only test methods capable of giving a quantitative measurement of shock absorption and of resistance to penetration should be developed and that these methods should be selected as being able to provide as accurate results as possible.

This is in itself a considerable advance, leading towards the abandonment of cruder methods which are used in some countries.

Established practice in a number of countries was recognized in that, for road helmets, accurate electronic methods of measuring shock absorption would be made the basis of ISO recommendations, whereas in the industrial field, the method of measuring the indentation made on an aluminium bar when the shock is transmitted through the helmet to the bar under standard conditions was adopted as an initial basis.

Since this was a first meeting, most of the decisions were on matters of principle. The working group on industrial helmets has developed the basic content of a specification and has allocated the study of particular problems to individual experts in the group.

# *Progress in Fuel Efficiency*

REVIEWING the sixth year of operation of the National Industrial Fuel Efficiency Service, the chairman, Sir Leslie Hollinghurst, says that although the guarantee of financial support for the initial period of five years has ended, the fuel industries have undertaken to continue to sponsor the organization.

Circumstances in the use of fuel are radically different from those existing at the start of operations, he says. In 1954, the country was still suffering from a serious fuel shortage, which threatened industrial development. By 1959, the shortage had been overcome and the supplies of fuel then became ample for almost every purpose. This was, in no small measure, due to progress in fuel efficiency, which depended largely on the continued attention to plant operation and maintenance. An analysis of the change in coal consumption in industry over the three years 1955 to 1958, during which the level of industrial activity remained very much the same, showed that the annual consumption fell by about 8,500,000 tons of coal, of which about 3,000,000 tons was due to the growth in the use of oil. The remainder, about 5,500,000 tons, was attributed to other causes, of which the biggest was considered to be the steady growth of fuel efficiency.

Sir Leslie says that the case for fuel efficiency has been presented by NIFES engineers on the basis of its financial advantages. They had shown that savings averaging 20 per cent. of fuel consumption could readily be made. For the most part, these savings were derived from better operation and maintenance of existing plant at negligible cost. Where capital expediture had been advocated, it had been rapidly recovered by the savings made.

Encouraged by the demands for the services of NIFES engineers, Sir Leslie believes that industry would not be too critical if they sought a more economic price for the service. It was, therefore, proposed to accelerate the trend towards recovering the full costs by increasing some of the fees from January 1, 1961. The year under review, from April 1, 1959, to March 31, 1960, had been a successful one, the earnings of £182,391 representing an increase of nearly 10 per cent. over the previous year.

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**Production of Benzene**

Production methods available to meet the increasing demand for pure benzene, conforming to more stringent specifications, were examined by Mr. D. Bradley (Newton, Chambers & Company, Limited) in a paper, "Some Aspects of Benzene Production," read before the Midland Section of the Coke Oven Managers' Association on September 21. Modern chemical plant techniques were invading the field of benzole production and must continue to do so to ensure that the desired quality was produced, the author said.

## *In Parliament*

# PRICE OF COAL

## "No Sense in Taxing Fuel Oil": Lord Mills

TO continue to permit the unrestricted inflow of fuel oil and possibly natural gas at any time, particularly when there were balance of trade difficulties, while there was an abundance of fuel on our own doorstep, was surely not sensible, said VISCOUNT HALL, speaking in a debate on fuel and power in the House of Lords on Wednesday. Nuclear energy could not play a major part in the generation of electricity for at least another decade—if then. The Government, should state the minimum figure of coal production for some years ahead.

Viscount Hall was commenting on the recent increase in the price of coal which had come about, he said, because the Government and the National Coal Board wanted to sell coal at prices sufficient to cover the cost of operating the industry. It was not the increase in wages and the one-hour reduction in working hours that caused the price increase. An increase of about 2s. a ton would have covered that.

LORD MACDONALD OF GWAENYSGOR also maintained that the Government should dispel the idea that the miners were the cause of the high price of coal. He referred to rumours that the Government might be getting back to district settlements in the industry and emphasized that the Government should consider the possibility of some machinery by which disagreements could be dealt with on the spot.

### Comprehensive Review Needed

The gratitude of the nation was due to the National Coal Board for so handling a difficult situation that it had kept masses of men in work and had avoided what used to be called depressed areas, said LORD LAWSON.

LORD HAWKE did not like the idea of a quota for oil but would be willing to see a duty. LORD WILMOT also suggested a comprehensive review of the fuel industry, the fixing of a national coal target, and the assumption by the Government of the financial responsibility involved in maintaining the target figure.

Asserting that it was not possible to fix a target for coal production, LORD MILLS, Paymaster-General and former Minister of Power, put the point of view of the oil industry and said there was no sense in taxing fuel oil unless it was needed for revenue. UK invisible earnings from oil and the exporting of oil equipment were normally more than enough to cover the cost to our balance of payments of the total UK imports of oil. It would be quite wrong to try to get the oil companies voluntarily to restrict imports.

He went on to give an assurance that the Government was not considering district settlements in the mining industry. Strikes were often the result of bad management and of not dealing with matters promptly. The Government was looking at the problem on the understanding that coal was the country's most important source of power and that coal which could be mined efficiently would be needed.

## Financing RTB Developments

GOOD progress in the construction of the new strip mill at Newport for Richard Thomas & Baldwins, Limited, was reported by the MINISTER OF POWER (Mr. Richard Wood, who said that the work, was, however, still in its early stages. The Minister said that the extension and acceleration of the original plans, announced on June 27, would also increase the requirement for working capital and involve additional finance in the short term to make good the reduction in the contribution which the company could make from its current revenues during the construction period.

Mr. Wood added: "Substantial finance will also be required for the company's developments elsewhere. In so far as these additional requirements have to be met out of public funds, the company will look to the Iron and Steel Holding and Realization Agency, which is its usual source of finance, for short-term requirements and normal developments."

The CHANCELLOR OF THE EXCHEQUER, Mr. Selwyn Lloyd, said in the Commons yesterday (Thursday) that the sale of RTB shares to the public was to be deferred until its extensive developments were nearer to maturity. There was going to be a loan of £70,000,000 from the Ministry of Power, and ISHRA had other funds, but not enough to finance the expansion. "So we propose to sell the fixed interest securities so that the agency shall have the money to enable the development to take place," he said.

It was still the firm intention that the work of ISHRA—including the sale of RTB—would be substantially completed by the end of this parliament.

### *Goverment's International Patents Plan*

BRITAIN is to sound other countries on the possibility of establishing an international body which would examine and approve patent specifications. Outlining the scheme on Tuesday, the President of the Board of Trade, Mr. Reginald Maudling, said he thought it would certainly help to increase international trade.

Under the scheme national patents would not be abolished, but participating countries would have to recognize the international patent as conferring a monopoly in their territory unless and until it was successfully challenged there.

*Board Changes*

# Triple Directorship for Sales Executive

MR. R. L. E. KEATES

UNTIL recently home sales director of STEELS ENGINEERING PRODUCTS, LIMITED, only, Mr. R. L. E. Keates has now joined the boards of R. H. Neal & Company, Limited, and F. Taylor & Sons (Manchester), Limited.

Mr. Keates, who joined Steels in 1946 as a technical sales executive on the Coles crane sales staff in the London area, now leads the home sales organization of the three companies which form the Steel Engineering Products group of crane and excavator manufacturers.

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GIRLING, LIMITED—Mr. G. R. Packer, general sales manager for many years, has joined the board as sales director.

FIRTH-VICKERS STAINLESS STEELS, LIMITED—Mr. G. W. Ashton, general works manager, and Mr. J. Elliot, secretary and chief accountant, have been appointed directors.

BARROW HAEMATITE STEEL COMPANY, LIMITED—Sir Harold Gillett has been appointed an additional director. He is chairman of Arusha Industries, Limited, the parent company.

DYNAMO & MOTOR REPAIRS, LIMITED—Mr. C. E. Vincent has been appointed a director and general manager is succession to Mr. T. A. Atkinson, managing director, who is retiring.

WADDELLS (STRATFORD STEEL EQUIPMENT), LIMITED—Mr. H. W. Gathergood has joined the board of the company, a subsidiary of the Expert Tool & Case Hardening Company, Limited.

STENNERS OF TIVERTON, LIMITED—Lord Amory of Tiverton, former Chancellor of the Exchequer, has rejoined the board from which he resigned on becoming a member of the Government.

FERRY-DIAMOND ENGINERING COMPANY, LIMITED—Mr. R. R. Kennan has joined the board. He will retain his directorships of Mono Pumps Africa (Pty), Limited, and Mono Pumps (Australia) Pty, Limited, and the general sales managership of Mono Pumps, Limited, London.

BIRMINGHAM RAILWAY CARRIAGE & WAGON COMPANY, LIMITED—Col. F. A. Stanley has been appointed deputy chairman in succession to Mr. H. J. S. Moyses, who has resigned from the post while retaining his seat on the board. Mr. F. D. O'Brien Newman has joined the board.

KAY & COMPANY (ENGINEERS), LIMITED—Mr. J. Sheard, Mr. F. Mannion, and Mr. J. G. Taylor have been appointed additional directors. Mr. R. Hayhurst, Mr. H. Knott, and Mr. L. Mawdsley have been appointed additional directors of S. S. Stott. Limited, which is also a subsidiary of Alenco, Limited.

SIGMUND PUMPS, LIMITED—Mr. H. I. S. Catherwood, who is joining the company as sales director on Tuesday, succeeds Mr. H. P. Lord, who has been appointed managing director of International Boilers & Radiators, Limited, a sister company in the Bookers group. Mr. Lord will continue on the board of Sigmund Pumps.

UNISTEEL STRUCTURAL (PTY), LIMITED—Mr. Derek L. Lee has been appointed managing director of the company, which is a branch of United Steel Companies, Limited. Mr. K. Paterson, director and general manager of United Steel Structural Company, Limited, Scunthorpe, has joined the board. Mr. H. M. Henderson who relinquishes the position of managing director at the end of the month in order to become director and general manager of Workington Iron & Steel Company, branch of United Steel, remains a member of the board.

BIRFIELD, LIMITED—Mr. C. G. T. Hyslop has retired from the board on reaching the age of 70. He is to continue as chairman of the subsidiary companies, the Phosphor Bronze Company, Limited, Kent Alloys, Limited, and R. Jones & Company, Limited. He joined the foundry of the Phosphor Bronze Company in 1906 and by the time it became one of the founder companies of the Birfield group in 1938 he had been a director for two years. He was appointed joint managing director in 1941 and retired as managing director at 65 in 1955 when he joined the Birfield board.

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# GLACIER METAL BUYS DUALLOYS

FOR a net sum of approximately £225,000 the Glacier Metal Company, Limited, has purchased the capital of Dualloys, Limited, formerly a wholly-owned subsidiary of Sterling Industries, Limited. Dualloy's profits were marginal for the year to March 31, and in a letter to shareholders, Mr. R. A. Harding, chairman of Sterling Industries, says that it was apparent that the current financial year would show a further decline.

The only solution, he states, would have been to instal additional plant to produce the range of thin wall bearings economically, and this would have cost over £100,000 plus further cash to build up stocks. This the group could not afford to do. Glacier Metal intends to continue Dualloy's business at Chard and to introduce fresh capital where required.

The proceeds of the sale will erase the Sterling group's £180,000 overdraft and the balance will enable a modest capital expenditure programme to be undertaken. Immediate outlook for the group, Mr. Harding says, seems to be one of decline, but from a long-term view it seems probable that expansion will take place and profits rise.

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# *Honeywell Capacity will be Doubled*

SIZE of the Lanarkshire factory of Honeywell Controls, Limited, manufacturers of automation equipment, will nearly double over the next three years. The factory, which is on the Newhouse Industrial Estate at Motherwell, now covers 190,000 sq. ft. The Board of Trade has approved plans to increase the size of the factory to 350,000 sq. ft.

The expansion, announced in London on Monday by the managing director, Mr. C. W. Spangle, will give work to another 1,000 people. Present labour force is 2,000, a quarter of whom have been added this year.

## *Company News*

# Technical Resources Pooled

## SIMON-CARVES AND INTERNATIONAL COMBUSTION

MERGER of technical resources has been announced jointly by International Combustion (Holdings), Limited, London, W.C.1, and Simon-Carves, Limited, Stockport (Ches). The announcement states that for many years past the two companies have enjoyed close technical liaison, particularly in the field of thermal power plants. Due to the interests of both being complementary in many other industries, it has been possible to develop inter-company trading to a very substantial extent, to the benefit of both parties.

The directors of both companies have therefore considered the possibility of even closer association and have decided that a measure of integration should be effected, resulting in greater overall efficiency in operation and wider fields of application of the extensive experience inherent in both organizations. At the same time the individual identities of both organizations will be preserved and no alteration to existing commitments and associations of either company is envisaged.

This integration of effort applies essentially to the technical fields and it is not intended that any merging of capital or financial resources should take place. It is added, however, that such joint financial resources would be available for any large industrial undertakings, particularly oversea, where substantial capital outlay and extended credit facilities might be required.

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STEETLEY COMPANY, LIMITED—Resolution subdividing the £1 ordinary shares into 5s. shares has been approved.

PLESSEY COMPANY, LIMITED—An offer is being made for the Garrard Engineering & Manufacturing Company, Limited. The two companies have reached an agreement in principle.

SILENTBLOC, LIMITED—Due to the heavy subscription of the recent rights issue, the relatively limited number of additional shares has been allotted to the smaller applicants, of whom a large number were seeking to round off their holdings.

F. FRANCIS & SONS (HOLDINGS), LIMITED, manufacturers of steel drums, etc., of London, S.E.13—Application is being made for a quotation for £750,000 6½ per cent. mortgage debenture stock, 1981-85. Particulars of the stock are now available.

BRITISH ELECTRIC TRACTION COMPANY, LIMITED—The interim dividend is increased to 12½ (10) per cent. on the deferred ordinary and "A" deferred ordinary stocks, on account of the year ending March 31, 1961. The total dividend in 1959-60 was 40 (35) per cent.

LEY'S FOUNDRIES & ENGINEERING, LIMITED—All the issued share capital of W. Shaw & Company, Limited, steelfounders, of Middlesbrough, has been acquired. It is intended that the management of W. Shaw shall continue and that the business will be developed "as appropriate."

GAS PURIFICATION & CHEMICAL COMPANY, LIMITED—Final dividend of 20 per cent. makes 35 per cent. for the year ended June 30, 1960. No dividends were paid for the two previous years. Group surplus was a record of £811,034 (£505,336), before tax of £376,125 (£212,874).

RANSOME & MARLES BEARING COMPANY, LIMITED—Group net profit rose from £609,396 to £836,910, after tax of £808,719 (£563,771), in the year ended June 30, 1960. It is proposed to make a one-for-two scrip issue and the final dividend is raised to 15 per cent., against 10 per cent. and a 2½ per cent. bonus a year ago.

TRIPLEX ENGINEERING COMPANY (GLOUCESTER), LIMITED—Realization of assets has been completed, but liquidation cannot take place until the two associated companies have been liquidated, the liquidator states. The possibility of any funds becoming available to meet the demands of unsecured creditors' claims is "exceedingly remote."

ASSOCIATED ELECTRICAL INDUSTRIES, LIMITED—In future, ordinary dividends will be paid in two half-yearly instalments—the interim in October and the final in April. The second quarterly interim of 6d. per £1 unit payable last week was the last quarterly dividend holders will receive. The move was taken after a questionnaire had been sent to holders.

BELL'S ASBESTOS & ENGINEERING (HOLDINGS), LIMITED—The rights issue is to be on the basis of two new shares for every five shares held, at 18s. a share. The £1,000,000 thus raised will be used to repay group bank overdrafts and to finance the continuing requirements of the group. It is hoped to maintain the final dividend at 12½ per cent. on the increased capital.

SYDNEY S. BIRD & SONS, LIMITED, electrical engineers, of Poole (Dorset)—The directors do not expect to pay a dividend in respect of the current year. In 1959 there was a single 20 per cent. payment. Adverse trading conditions were experienced in the first nine months of the year and the company made a trading loss. Following considerable reorganization, the position has stabilized to some extent.

WILLIAMS & WILLIAMS, LIMITED—Payment of the preference dividend for the half-year to October 31, 1960, is to be postponed. The dividend is now in arrears from November 2, 1959. In his statement last month, the chairman, Mr. S. R. Hogg, said that 1959-60 was a period of "near crisis," but following reorganization taking place, the board hoped that the not too far distant future would bring renewed prosperity.

R. & W. HAWTHORN, LESLIE & COMPANY, LIMITED, shipbuilders and engineers, of Newcastle-upon-Tyne—Despite shortening order-books and keen competition,

there has been "considerable activity with gratifying results" in the year ended June 30, 1960, states Sir Robert Rowell, the chairman. Renewed wage claims, coupled with rising prices of goods and services, will make continued full employment difficult to maintain, he says.

WALMSLEY (BURY) GROUP, LIMITED—Final dividend of 17½ (15) per cent. makes 22½ per cent. for the year ended June 30, 1960, against 20 per cent. previously. The year's distribution is on capital increased to £1,250,000 under the agreement with the Beloit Iron Works, of Wisconsin, whereby Beloit subscribed for 250,000 Walmsley £1 ordinary shares at 110s. per share. Group net profit was £463,607 (£419,551), after tax of £463,450 (£412,950).

PARKINSON COWAN, LIMITED—In repeating the interim dividend at 5 per cent., the directors state that they hope to maintain a total which, although lower than last year, will be "judged satisfactory." In 1959 holders received an effective 17½ per cent. total, which included a 2½ per cent. bonus. The financial year is to be changed to March 31 and the next accounts will be published about July 1, 1961, and will cover 15 months. In view of the discontinuity, payment of a second dividend will be considered in May.

WICKMAN, LIMITED—The formal offer of 18s. 6d. per 4s. share of the capital of the Coventry Machine Tool Works, Limited, has been sent to holders and is recommended by the Coventry board. In a letter to holders, Mr. A. Speak, chairman of Coventry Machine Tool, states that an increase in the number of orders has come too late to affect the results for the current year, which will be lower than those of 1959. The improved order-book, however, would normally lead the board to expect last year's results to be repeated in 1961.

RICHARDS BROS. & SONS, LIMITED, manufacturers of cutlery and hand tools, of Sheffield—A 100 per cent. scrip issue is to be made Since the company was made public, states Mr. Paul Rickhartz, the chairman, the financial position has been consolidated to such an extent that the board feels justified in recommending a higher dividend. For the past two years, 30 per cent. has been paid on the £150,150 ordinary capital. The directors expect to pay 20 per cent. for the year to March, 1961, which will be equivalent to 40 per cent. before the scrip issue.

NORTH BRITISH LOCOMOTIVE COMPANY, LIMITED—For the 28 weeks to July 29, 1960, a trading loss of £41,692 was incurred on invoiced sales of £4,000,000, against a loss of £190,827 for the corresponding 28 weeks of last year on £2,700,000 sales. Mr. T. Coughtrie, the chairman, states that the improvement is due to the introduction of works method and of economies effected, rather than to a larger volume of dispatches. Orders on hand, amounting to £7,800,000 on July 29, are quickly diminishing and prospects of locomotive orders are "somewhat bleak," he adds.

DAVIS & TIMMINS, LIMITED, screw manufacturers, of London, E.17—The issue of 221,250 5s. ordinary shares at 25s. each on a one-for-10 basis to holders on October 14 will raise approximately £273,300. About £70,000 is needed for buildings, plant, and equipment and the balance will go to the working capital. The directors report an increase of 40 per cent. in group sales turnover for the nine months ended September 30 and it is expected that 1960 group profits will "considerably exceed" last year's. The interim dividend is 10 per cent. and it is expected that a final of not less than 20 per cent. will be paid on the increased capital.

# Coal Stocks Position

DETAILS of coal stocks as at October 15, 1960, compared with those available at October 17, 1959, are given in the appended table issued by the Ministry of Power.

Figures in parentheses, mainly calculated on the basis of requirements during the winter, indicate the total weeks which the tonnage in stock would last.

| Week ended:— | Oct. 15, 1960. | Oct. 17, 1959. |
|---|---|---|
| | Thous. tons. | Thous. tons. |
| *Distributed stocks—* | | |
| Public-utility undertakings— | | |
| Gas | 1,907 (3.7) | 2,589 (4.8) |
| Electricity | 6,379 (5.4) | 7,227 (6.4) |
| Railways | 446 (2.4) | 499 (2.4) |
| Coke ovens | 1,405 (2.6) | 1,143 (2.3) |
| Industrial consumers— | | |
| Iron and steel | 198 (2.3) | 195 (2.3) |
| Engineering and other metal industries | 292 (3.3) | 340 (3.9) |
| Other industries | 1,767 (3.4) | 1,851 (3.5) |
| TOTAL INDUSTRIES | 2,257 | 2,386 |
| Merchants' stocks— | | |
| (*a*) House coal | 1,460 (1.9) | 1,939 (2.6) |
| (*b*) Anthracite and boiler fuel | 192 (3.2) | 233 (3.9) |
| Miscellaneous (estimated) | 344 | 399 |
| TOTAL DISTRIBUTED STOCKS | 14,390 | 16,415 |
| *Undistributed stocks—* | | |
| At collieries (on ground and in wagons) | 27,349 | 27,884 |
| At open-cast sites | 6,332 | 6,938 |
| TOTAL UNDISTRIBUTED STOCKS | 33,681 | 34,822 |

# *Coal Chartering*

NO improvement is recorded in the volume of tonnages recently fixed from Hampton Roads, irrespective of destination, neither does there appear to be any immediate prospect of an improved demand. Nevertheless tonnage continues to be taken up for Japanese account and recent fixtures, including the 13/14,000-ton size, have been arranged for November and November/December positions at $8.20, whereas 14,000 tons for January secured 10 cents extra. Interest is maintained and charterers are prepared to go ahead for forward loadings.

There is a varied demand for tonnage to load from continental ports to Mediterranean and other destinations with 6,000 tons of coke reported from Bremen to Buenos Aires for late October at 45s., and a 2,600-tonner from Stettin to Setubal for second half November at 30s.

As far as the UK is concerned, tonnage is required to West Italy but charterers' indications do not appear to be attractive to owners and business is therefore somewhat difficult to arrange. Tonnage is required coastwise from both east and west coast UK. Newcastle, NSW, to Miike fixed 9,200/9,800 tons for end of October/November at 35s. f.i.o. and trimmed.

# THE COAL TRADE

RETAIL merchants face the beginning of the winter period next Tuesday with many unfulfilled orders at summer prices on their books, and in some areas stocks, which were whittled away by the unprecedented late summer rush for house coal and an ensuing steady demand, leave much to be desired. An autumn lull in householders' requests could provide merchants with a valuable opportunity for building up reserves before the next onslaught arrives. There is a brisker air about industrial inquiries, but, generally speaking, demands for all descriptions are being met satisfactorily.

### SCOTLAND

**Glasgow**—The spell of mild weather has retarded the earlier expansion in consumption, but the supply position remains tight in a number of sectors, and in others the margin is narrow. Demand for house coal before the winter increase in prices remains heavy, and all orders cannot be met. The effect of persistent calls from householders is reflected in a slight decline in depot stocks from 288,000 tons to 287,000 tons, but this is virtually the same total as last year.

All groups are in demand, and fresh-wrought supplies clear promptly. Doubles find a brisk trade; the growth in their popularity, both loose and in pre-packed form, has all the appearance of permanency. Trade in alternative domestic fuels continues to strengthen; good sales of "Coalite," "Phurnacite," and other patent fuels are reported, while hard coke nuts and gas coke are also moving more freely. Anthracite is attracting more attention, and merchants who accumulated a stock in the summer are finding ready outlets.

In the industrial sector a more even demand is maintained, with the emphasis still on coking smalls. A steady reduction is taking place in stock accumulated last year when the steel trade was quiet, and once this has been exhausted it is evident that the strain on fresh-mined coal will intensify if blast-furnace activity continues on its present scale. Increasing throughputs at power stations ensure a good market for washed and untreated smalls, and singles, pearls, and duff are also well taken up. Consumption of metallurgical coke remains high, but coke-oven capacity is adequate.

**Fife and Lothians**—Production from both zones is moving away well, with large coal notably short of requirements. Sized sorts are more comfortably balanced against industrial requirements. Business in the export market is sporadic.

## *Durham Miners Reject Bagged Concessionary Coal*

PROPOSAL that Horden (Co. Durham) miners should receive their concessionary coal in bags instead of the present bulk delivery was unanimously rejected by the local miners' lodge on Sunday. Complaints have been made recently that the bulk deliveries cause obstruction on roads, particularly on council housing estates.

The proposal would have meant that the men would have received cleaner and better coal, but they would have had to forgo 66 cwt. of their annual allocation to cover the cost of bagging.

## Coal Output Drops by Over 10,500,000 Tons

SALEABLE output of coal for the first 42 weeks of the year was 155,851,800 tons, compared with 166,684,700 tons in the corresponding period of 1959, a drop of 6.5 per cent. Of this total, open-cast production accounted for 6,244,100 tons, which was just under 3,000,000 tons (32 per cent.) less than last year. Deep-mined output at 149,607,700 tons is just under 5 per cent. down on last year.

There were 587,000 wage-earners on colliery books on October 15, against 642,600 on October 17, 1959, the numbers engaged at the coal face being 222,000 and 248,800 respectively. Total absenteeism (all workers) in the week ended October 15 was 14.76 per cent. compared with 14.46 per cent. in the week ended October 17, 1959. Output at the face was 4.073 tons and overall 1.430 in the week ended October 15, compared with 3.801 and 1.362 tons in the week ended October 17.

The following table gives (in tons) the output of saleable mined coal by division in the week ended October 22, and the tonnage lost through all causes (holidays, disputes, and go-slows):—

| Division. | Week ended October 22, 1960. | | Week ended October 24, 1959. |
|---|---|---|---|
| | Total output. | Tonnage lost. | Total output. |
| Scottish .. .. | 353,600 | 8,500 | 379,100 |
| Northern (N&C) .. | 248,500 | — | 254,700 |
| Durham .. .. | 469,100 | 100 | 473,000 |
| North-Eastern .. | 831,100 | 13,900 | 851,300 |
| North-Western .. | 258,300 | 2,400 | 285,600 |
| East Midlands .. | 890,900 | 700 | 910,400 |
| West Midlands .. | 277,200 | — | 306,100 |
| South-Western .. | 388,900 | 3,500 | 413,000 |
| South-Eastern .. | 32,000 | — | 33,000 |
| Great Britain— | | | |
| Deep-mined coal .. | 3,749,600 | 29,100 | 3,906,200 |
| Other deep-mined (including licensed mines) .. | 39,200 | — | 60,800 |
| Open-cast coal .. | 128,800 | — | 180,200 |
| TOTAL .. .. | 3,917,600 | 29,100 | 4,147,200 |

Prof. HERBERT WALKER SWIFT, Emeritus Professor of Mechanical Engineering at Sheffield University has died at the age of 65. For two years after the First World War he was chief engineer with William Hollins, Limited, and he then joined Leeds University as assistant lecturer, becoming head of the mechanical engineering department at Bradford College of Technology in 1926. He was appointed to a Chair at Sheffield University 10 years later.

*Coalfield News*

# Still Room for More Safety

DESPITE the good accident record at Bradford Colliery, Manchester, there was still room for improvement, said Mr. A. Beaumont, assistant general manager of the No. 1 (Manchester) Area, North-Western Divisional Coal Board, when he opened the colliery's safety week last week. The incidence of accidents at Bradford was 86 per 100,000 shifts, compared with 112 for the Area and 130 for the division, he said.

Clock Face Colliery, near St. Helens, which pioneered pit safety weeks in the division, opened its second such week on Monday. A cross-section of all the men at the pit—including the manager, Mr. J. Abbott, an underofficial, a NUM representative, a coal-face worker, and a youth on haulage, all had their voices recorded on tape so that they could broadcast on safety as their colleagues went down the pit each day.

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SIX BELLS COLLIERY Disaster Fund now stands at over £93,200.

EXTRA PAY for working in water has been claimed by miners at the new Bramley Vale Drift mine (Derbyshire).

TWO MEMBERS of Old Roundwood Colliery (Yorks), Mr. William Stead and Mr. J. W. Dyson, have retired after 50 years' service each in the coal industry.

YORKSHIRE Area council of the National Association of Colliery Overmen, Deputies, and Shotfirers has approved the national executive's acceptance of the 15s. 6d. wage increase for its members.

FORMERLY an underground worker at Easington Colliery (Co. Durham), the Rev. Roy P. Spencer, has been instituted as vicar of Middlestown and Netherton (Yorks).

YORKSHIRE AREA of the National Association of Colliery Overmen, Deputies and Shotfirers has elected Mr. Gilbert Fellows, NUM branch secretary of Houghton Main Colliery, as agent for the Area.

MICKLEY COLLIERY (Derbyshire) is to be closed by August, 1961. Employment will be found for 140 miners, but when the pit closes 310 men will become redundant. The first batch of 60 men will be paid off in April, 1961.

VERDICT of Accidental Death was returned on Mr. Josef Emil Jaworski (43), a miner, who was killed when he was trapped between a steel girder and a coal-cutting machine he was operating at Cannock Wood Colliery (Staffs).

COAL SHIPMENTS from Blyth in September amounted to 211,714 tons, a decrease of 179,524 tons on 1959, due to the seamen's unofficial strike. For the nine months of the year, the total was 3,768,827 tons, an increase of 11,643 tons.

FOR the third year in succession, Rawdon Colliery first-aid team has won the Elliott Trophy, awarded at the annual Wigston (Leicestershire) St. John Ambulance Brigade competition. English Electric Company, Limited, team was second.

WORK was resumed at Brodsworth Colliery (Yorks) on Monday after an inspection of the 550-yd. shaft leading to the Thorncliffe seam. A mine car fell down the shaft last week. The delay affected 600 men and cost an estimated 6,000 ton of coal.

WOLSTANTON COLLIERY, the pit which did not win a single team event in the annual North Staffordshire colliery sports competitions, managed to win the Area championship trophy through the consistency of its entrants who secured a place in most of the events. More than 230 trophies were presented to men from 15 of the Area's 19 collieries by Mr. H. Lockett, secretary of the North Staffordshire branch of the NUM, on Saturday.

RUBY WEDDING anniversary was celebrated last week by Mr. and Mrs. Isaac Finley, of Ushaw Moor (Co. Durham). Mr. Finley, who is 89, is a retired miner, having worked at Ushaw Moor Colliery and been secretary of the local miners' lodge for nearly 30 years.

NEW SPORTS ARENA is to be built at Monk Bretton (Yorks). It will be financed at a cost of £25,000 by the Coal Industry Social Welfare Organization and will be maintained by Monk Bretton Miners' Welfare Scheme. The men will contribute to the scheme and will pay a nominal sum for the use of the arena.

EXECUTIVE committee of the National Union of Mineworkers investigating alleged "rigging" of the ballot by which Mr. J. Gormley was elected general secretary of the Lancashire Area, found no irregularities. The committee is now to consider alleged irregularities at some of the Lancashire NUM branches.

ROTHERHAM CHAMBER OF TRADE has decided to withdraw its protest to Rotherham Corporation that the Yorkshire Miners' demonstration held in June was disastrous to retail trade and should not be held in the town again. The protest was described by members as "conceived in anger and sent in haste."

LEICESTERSHIRE NUM COUNCIL has confirmed the verdict of the executive committee on Mr. Martin Ryan, a Leicestershire NUM lodge secretary. The committee suspended Mr. Ryan for two years from holding office in the union. Mr. Ryan has stated that he will appeal to the national executive of the union.

NOVEMBER ISSUE of "Mining Review," the National Coal Board's newsreel, features the return of Olympic medallist Dorothy Hyman and a visit to the home-town of Bedlington terriers. Experiments with high-powered hoses to wash coal from outcropping seams in New Zealand and the part that coal plays in the manufacture of chocolate are two other items.

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## *NUM Expels Yorkshire Winders*

EXPULSION of the Yorkshire Winding Enginemen's Association from affiliated membership of the National Union of Mineworkers is to take effect from December 5. This was announced at a meeting of the association's executive committee at Barnsley on Tuesday. The same decision has been reached by the NUM on the expulsion of the Nottinghamshire and Derbyshire Winding Enginemen's Association.

A representative of the enginemen will be allowed to attend NUM council meetings for two years with the power to take part in discussions, but not to vote. Yorkshire officials of the union said that in their opinion the enginemen "have all to gain and nothing to lose." The association's Yorkshire executive said after the announcement that it felt it was "not desirable, or likely to ease the friction, if more is added to what has already been said."

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W. & J. LAWLEY, LIMITED, brass and iron founders, of West Bromwich (Staffs)—An unchanged dividend of 25 per cent. is to be paid for the year ended July 31, 1960, plus a 5 per cent. bonus. Group net profit was £49,223 (£45,200), after tax of £48,947 (£42,097). A one-for-five scrip issue is proposed and in this connection an extra-ordinary meeting will be called early in 1961.

# *Too Little Attention to Exports*

FIRMS which devote too much thought to profits today and insufficient to profits in 10 years' time came under fire from Sir Norman Kipping, director general of the Federation of British Industries, in Sheffield on Tuesday. "We have to bring home increasingly to that type of company that the whole of the country's wellbeing is wrapped up in the need to increase exports," he said.

Sir Norman was addressing over 100 representatives of Sheffield companies at a FBI conference on education and training in export marketing. He said that he felt there was a need for an export training college. To the objection that some firms, especially smaller ones, could not spare their salesmen time at college he said: "I wonder if they don't expect to get away with it a little bit too cheaply."

Among the papers read at the conference were those by Mr. Geoffrey Craven, managing director of the English Steel Export Corporation, Limited, and Mr. Eric E. Jones, group commercial director of the Solatron Electronic Group, Limited.

# Increased Trade for South Wales Ports

IMPORTS of iron ore through the South Wales ports so far this year have increased from 3,098,707 tons in 1959 to 3,927,443 tons and foreign arrivals of iron and steel, including scrap, have risen from 64,010 tons to 295,549 tons. Tinplate exports up to October 9 totalled 359,179 tons against 343,102 tons, in the corresponding period of 1959, but iron and steel shipments fell from 383,624 tons to 260,397 tons.

Outward foreign trade in coal and coke rose from 865,873 tons in 1959 to 939,000 tons, but coastwise shipments dropped from 1,156,820 to 1,046,672 tons.

Trade through the South Wales ports for the first 9 months of the year (with 1959 figures in parentheses) were as follow:—Newport, 1,823,415 (1,715,795) tons; Cardiff, 1,806,621 (1,702,310) tons; Barry, 1,008,721 (971,251) tons; Port Talbot, 2,908,500 (2,161,251) tons; Swansea, 6,277,003 (5,807,890) tons; Penarth, 286,133 (300,339) tons; Lydney, 22,326 (21,604) tons.

# Wolverhampton Die Casting Merger Offer

OFFER to acquire the ordinary shares of British Pressure Diecasting, Limited, has been made by the Wolverhampton Die Casting Company, Limited. The basis of the offer is one Wolverhampton 2s. ordinary for each 5s. BPD ordinary and the terms which have been agreed by both boards, will be recommended to holders. Wolverhampton 2s. closed on Tuesday at 10s., making the deal worth £360,000.

The directors of BPD intend to accept in respect of their own holdings, which together with other approvals amount to over 60 per cent. of the ordinary capital. Full details of the proposed merger are to be forwared to shareholders as soon as possible.

# Flourishing ECSC Steel Industry

FORECASTING an increase of 7 to 9 per cent. in industrial production for the European Coal and Steel community in the fourth quarter of this year, M. P. Reynaud, a member of the High Authority, has stated that this would mean that estimated expansion rate in ECSC output for 1960, compared with 1959, would be at the record level of 11 per cent. —the highest since 1955.

The position on the ECSC steel market was good, particularly in West Germany and, although increased competition must be reckoned with in steel exports, foreign demand was still strong.

Over the first three quarters of the year 54,300,000 metric tons of steel was produced in the Community, compared with only 45,800,000 tons for the corresponding period last year. The rise in coal output was insignificant—200,000 tons to 174,300,000 tons.

In the first nine months of the year West Germany produced 23,500,000 tons of raw steel and 21,420,000 tons of pig-iron. Comparative figures for 1959 do not give a true picture as they included only two months of the considerable output from the Saar.

The expansion is reflected in the production and turnover figures for one of West Germany's largest steelmakers—August Thyssen-Hütte. In the year ended September 30, 1960, production of crude steel amounted to 3,900,000 (3,200,000) tons, and rolled steel to 3,400,000 (2,700,000) tons.

A second semi-continuous hot-strip mill is to be built on which it will be possible to roll hot strip up to a width of 2 metres. This, together with other planned expansion schemes, should raise capacity from the present 260,000 tons a month to 350,000 tons a month by the end of 1963.

# WELLMAN SMITH OWEN'S GERMAN AGREEMENT

AGREEMENT has been signed between Wellman Smith Owen Engineering Corporation, Limited, and Schloemann, AG, of Germany, for collaboration in building hot and cold rolling mills, both for ferrous and non-ferrous metals, for the UK and Commonwealth. The intention is for Wellman Smith Owen to manufacture plant to the German design.

The two companies have co-operated before on individual projects, such as the replacement of a rolling mill at the Stewarts and Lloyd, Limited, Corby works in 1958, and it is expected that the new agreement will enable British contractors to obtain work which might otherwise have gone oversea.

## *UK Sales Subsidiary for John Deere-Lanz*

SALES and service of the industrial range of tractors and equipment made by John Deere-Lanz, AG., Mannheim, has been undertaken exclusively by a new subsidiary, J. D. Tractors, Limited, Windsor. The former British importers, H. Leverton & Company, Limited, and Fred Myers, Limited, have withdrawn "to enable greater concentration on their other interests," it is stated.

Several members of the two companies have joined the staff of J. D. Tractors.

*Appointments*

# Assistant Sales Manager for Goodyear Pumps

MR. N. J. FULLER

NEW assistant sales manager for Goodyear Pumps, Limited, London, W.1, a company in the Holman Bros., Limited, group, is Mr. N. J. FULLER.

Mr. Fuller, who is 30, joined Goodyear on the sales side in January, 1959, from Megator Pumps & Compressors, Limited. He was formerly with Head Wrightson Processes, Limited, working on designs for oil refinery plant, and as sales engineer on chemical pumping equipment for Kestner Evaporator & Engineering Company, Limited.

Mr. J. C. REID, who joined Goodyear Pumps from the parent company in 1958 has been appointed representative in Scotland and will operate from the company's offices at 20-26, Ashton Lane, Glasgow.

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Mr. H. SAUNDERS has joined the Consett Iron Company, Limited, as superintendent of the constructional departments.

Mr. N. E. F. HITCHCOCK has been appointed laboratory manager of the main research establishment of the Castrol Group, Limited.

SCOTTISH TAR DISTILLERS, LIMITED—Lt.-Col. Thomas R. Craig, a director of Colvilles, Limited, Glasgow, has joined the board.

Mr. F. J. BURGE, British Railways district operating superintendent at Derby, has been appointed to a similar post at Sheffield. He has previously served at Gloucester, Nottingham, and Birmingham.

Mr. MAURICE W. BUTTLER has resigned as works manager of C. G. Carlisle & Company, Limited, Sheffield, and has joined Atlas Steels (England), Limited, Luton, as a technical sales representative.

Mr. J. HOBLEY, formerly manager at Stanley Colliery (Derbyshire) has taken up a similar post at Woodside Colliery (Derbyshire). He has been succeeded by Mr. E. BRIDGETT, formerly manager at Mapperley Colliery.

Mr. RICHARD S. REICHMANN has been appointed manager of industrial relations, a newly-created position at Atlas Steels, Limited, Welland, Ontario. Before joining Atlas Steels, Mr. Reichmann served in various plant management, personnel and industrial relations positions with the Inland Steel Company, US.

Mr. TOM HANNABY has been appointed general sales manager of the Mine Safety Appliances Company, Limited, Glasgow. Before joining the company he was sales manager of Multitone Electric Company, Limited, and earlier on the oversea sales staff of the Automatic Telephone & Electric Company, Limited.

Mr. N. L. LUPTON has been appointed contracts manager of the Plessey Company, Limited, makers of electronic equipment, etc., of Ilford. During the war, Mr. Lupton was seconded to the US 8th AAF as an armament specialist. Later, he became founder and chief instructor of the US Power Turret School, at Kirkham (Yorks).

Mr. S. H. BROOKS has been appointed works manager (iron) at the Appleby-Frodingham Steel Company, branch of the United Steel Companies, Limited. He will succeed Mr. N. D. MACDONALD, who is to become general works manager at the Workington Iron and Steel Company branch. Mr. H. S. AYRES is to become assistant works manager (iron) at Appleby-Frodingham.

Mr. W. K. CUNLIFFE, sales secretary of Leyland Motors, Limited, for the past five years, has been appointed general manager of Leyland Albion (Africa), Limited. He will take up his new position in January at the company's Elandsfontein, Johannesburg, headquarters. Mr. B. C. BAKER, sales manager of the export division of Leyland Motors, has been appointed as Mr. Cunliffe's successor.

Mr. G. JEAVONS has been appointed by the West Midlands Divisional Coal Board to be reserve manager in the South Staffordshire and Shropshire Area. From February, 1959, until its recent closure due to exhaustion. Mr. Jeavons was manager of Sandwell Park Colliery. For two years before going to Sandwell Park he was manager of Beech Tree Colliery, and he had previously been manager of Baggeridge Colliery for some years.

Colliery mechanical engineer at Maltby Colliery, near Rotherham (Yorks) since 1957, Mr. J. HOPKINSON has been appointed mechanical engineer for No. 2 Group, North Staffordshire Area of the West Midlands Divisional Coal Board. A former directed practical trainee, Mr. Hopkinson spent seven years as draughtsman and assistant to the colliery engineer at Kineton Park Colliery in the No. 1 (Worksop) Area, North-Eastern Division and on completing his training continued at Kineton Park before going to Maltby.

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## *New Anglo-American Company*

NEW company, Lightnin Mixers, Limited, has been formed by Stockdale Engineering, Limited, Poynton (Ches), and the Mixing Equipment Company (Mixco), Rochester, New York. The new company has taken over the range of standard UK mixers and will also market the complete line of Lightnin industrial mixers.

In a joint statement with Mr. F. H. Gordon, president of Mixco, Mr. W. Stockdale, chairman of Lightnin Mixers, said that products will be manufactured at the Stockdale works, which is being doubled in floor area to meet the additional demands.

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## Manpower Warning to Industry

FURTHER expansion of the economy may be limited by the present manpower shortage. Representatives of the British Employers' Confederation, the TUC, and the nationalized industries received this warning on Wednesday in a paper read at a meeting of the Ministry of Labour's National Joint Advisory Council.

Industry was also urged to take advantage of the "bulge" in the numbers of school-leavers and to use its present manpower as economically as possible.

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SOUTH WALES miners' executive is to recommend all Welsh miners to boycott South African Rugby Union games in the Principality.

# NEWS IN BRIEF

FINNISH State Railways has ordered 200,000 metric tons of lines, worth 10,000,000,000 Finnmarks, from the USSR.

BELGIAN coal and steel concern, Forges de la Providence, has doubled its dividend to 7.15 per cent. for the year ended June 30, 1959.

VISITS TO A coal mine and factories in Wales are included in the itinerary of a party of Yugoslav economists which arrived in London on Sunday.

NEW PLANT for the production of tubes and galvanized tubes is to be built by the American ARMCO International Corporation at Abbeville, in France.

SEMI-CONDUCTOR division of the General Electric Company, Limited, has acquired a factory at Reddish, near Manchester, to enable it to proceed with expansion plans.

THE CARDIFF OFFICE of George Ellison, Limited, electrical switchgear manufacturers, etc., of Perry Bar, Birmingham, is now at 306, Western Avenue, Llandaff (telephone: Cardiff 72701).

TO OBTAIN an overall additional revenue of 10 per cent. British Railways announces that charges will be adjusted from November 1. The last general increase in rates was made in May, 1957.

AGREEMENT has been signed between Whessoe, Limited, and Selas Corporation, of the US, under which Whessoe will make and supply "gradiation" heaters, which are extensively used in oil refining.

STEEL PRODUCTION in the US this week is estimated by the American Iron and Steel Institute at 1,516,000 tons compared with 1,579,000 tons (revised) last week and 371,000 tons in the corresponding week of last year.

FOUR new wire production units are to be built in Germany by Klöcknerwerke, AG, Hüttenwerke Oberhausen, AG, Ilseder Hütte concern together with the State-owned Hüttenwerk Salzgitter, and in the Saar, by Nenkirchener Eisenwerk.

THE ERSKINE TROPHY, which is competed for annually by savings groups in the Scottish Division of the National Coal Board, has been won by Pennyvenie 2/3/5/7 Colliery, Ayrshire. The runners-up were New Cumnock Colliery and Pennyvenie No. 4 Colliery.

DIVIDEND of Klöcknerwerke, AG, the German steel and coal concern, is raised from 8 to 12 per cent. for the year ended June 30, 1960. A one-for-five rights issue at 130 per cent. is proposed and the capital will be increased from DM250,000,000 to DM300,000,000.

NEW HENDERSON GRAVING DOCK of the Richardsons, Westgarth & Company, Limited, group was opened at Immingham last Friday. With a length of 600 ft. and a width of 98 ft., it is the largest between the Thames and the north-east coast and was built at a cost of over £2,000,000.

SECOND 180-MVA 275/132-KV UNIT which Fuller Electric, Limited, a member of the Hawker Siddeley Industries, Limited, built for the Central Electricity Generating Board was despatched last week. Each unit, with its 11-ft. high bushings, stands 25 ft. 6 in. high and weighs 263 tons.

THE Algoma Steel Corporation, Limited, and two wholly-owned Canadian subsidiaries, Algoma Ore Properties, Limited, and Canadian Furnace Company, Limited, are now amalgamated into one company named the Algoma Steel Corporation, Limited. The two former subsidiaries are now known as Algoma Ore Properties Division and Canadian Furnace Division. There will be no changes in operations, personnel, and offices.

IN ACCORDANCE with the wage settlement reached last February, the 250,000 men in the civil engineering industry start a 40-hr. week on Monday. The shorter week will be worked for the four "winter" months and during the eight-month "summer" season the men will work 44 hr. a week.

VISIT TO THE Stanton Ironworks Company, Limited, near Nottingham, was made by 85 members of the Midland Junior Gas Association on Thursday of last week. The party toured the company's Erewash foundry, one of the blast-furnace plants, and two of the spun iron pipe plants.

IN A STATEMENT released yesterday (Thursday), Sir James Milne, chairman of the council of the British Shipbuilding Research Association, announced that total expenditure by the association rose during the year to March 31 last by £53,000 to £330,000. Spending during the current year is expected to rise again to £435,000.

ANOTHER SIX "Export Round Table" conferences are to be held by the Federation of British Industries. The first will be at Southport on November 11, followed by conferences in Cardiff on November 23, Reading on November 24, Birmingham on November 29, Exeter on November 30, and Bristol on December 13.

OLD COAL WORKINGS under the site of the second stage of Sheffield's Park Hill flats scheme are to be filled in by a method of ground consolidation which, it is believed, has not been used in Britain before for this purpose. The old workings will be filled in with cement-based grouts with sand, stone dust, and fly ash injected through boreholes under pressure.

FRENCH ENGINEERING concern of E. Demolin has entered into an association with Associated Engineering Company, Limited, by an exchange of shares which will give each company a minority holding of the other's capital. Demolin manufactures pistons and sleeves and hopes to be able to market similar AEC products in France and the French African States.

ENTIRE OUTPUT of forage harvesters designed and manufactured by Gloster Equipment, Limited, a member of the Hawker Siddeley Group, Limited, is to be marketed exclusively by International Harvester Company of Great Britain, Limited. Distribution will be on a world-wide basis and the machine will in future be known as the McCormick International Gloster forage harvester.

## Insecure Load Killed Young Surveyor

RETURNING a verdict of Accidental Death on Mr. Terence John Taylor (22), a mining surveyor, a south-east Staffordshire inquest jury recommended that loads of girders on underground trolleys should be lashed with chains. It was stated that a trolley at Hamstead Colliery was loaded with girders in the usual way, except that no wooden wedges were used as the load seemed secure.

As the train pulling the load to the coalface passed Mr. Taylor the girders fell off and he was killed.

*Orders Placed*

# Turbo-blower for Cleveland Steelworks

ORDER valued at £139,000 for the supply and installation of a turbo-blower at the Cleveland Works of Dorman Long (Steel), Limited, has been received by the General Electric Company, Limited. The new machine will be installed alongside two 90,000 c.f.m. blowers also supplied by GEC.

The blower, which is to supply air to blast furnaces, will be of the centrifugal type having three impellers each of 66 in. diameter running at speeds up to 3,200 r.p.m. Condensing plant will be supplied by Mirrlees Watson & Company, Limited, Glasgow.

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BELTING DIVISION of the Dunlop Rubber Company, Limited, has secured an order from the USSR for 6¼ miles of specially designed conveyor belting. The duck for the belting will be made from man-made fibres.

FLOATING GRAIN ELEVATOR has been ordered from Simon Handling Engineers, Limited, by the British Transport Commission. The elevator, capable of handling 300 tons of grain an hour, is for King George Dock, Hull.

SUPPLY AND ERECTION of three electromersible pumps for the Patcham pumping station of Brighton Corporation Waterworks is to be undertaken by Hayward Tyler & Company, Limited. The value of the order is about £24,000.

GROUND FOUNDATIONS for the Ravenscraig Steelworks of Colvilles, Limited, including the foundations for two blast furnaces and ancillary works, are to be constructed by Tarmac Civil Engineering, Limited, Wolverhampton. The contract is worth £500,000.

ROPE DRIVEN CONVEYOR, almost 6,000 ft. long, has been ordered from Cable Belt, Limited, Inverness, by the Birkett Creek Mine, in British Columbia. The conveyor will handle copper ore on a gradient in favour of the load with a vertical fall of over 1,000 ft.

ORDER has been placed by U.S. Industries Inc. (Great Britain) with the British Iron & Steel Corporation, Limited, for supply by the Appleby-Frodingham Steel Company, branch of the United Steel Companies, Limited, of special steel sections to be used in the construction of railway wagons in Mexico. The order is worth more than £100,000.

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## *Joint Purchasing Conference*

RESPONSIBILITIES and qualifications of the man spending more of a company's money than any other section will provide the theme of a two day conference to be held by the British Institute of Management, in collaboration with the Purchasing Officers' Association, at the Connaught Rooms, Great Queen Street, London, W.C.2, on November 10 and 11.

Among those presenting papers will be:—Mr. C. F. Huebner, buying controller, British Oxygen Company, Limited ("The Purchasing Function"); Mr. J. Murray Grammer, director-general (purchasing and stores), National Coal Board ("The Selection and Training of Purchasing Personnel"); and Mr. F. S. Lloyd, chief buyer, B.T.R., Limited, group ("The Effect of Buying on Selling"). The chairman will be Mr. A. E. Thomas, chief buyer, British Belting & Asbestos, Limited.

# *Scots Apprentices May Be College-trained*

NEW system of training apprentices so that they will spend their first three years wholly at a technical college before entering industry is being explored by the Scottish Technical Education Consultative Council. In its first report the council states that an experimental training centre on the lines of a French *centre d'apprentissage* is being considered.

Before making any firm recommendation to the Secretary of State for Scotland the council has asked both sides of industry to indicate whether they will support a pilot scheme for 40 engineering apprentices whose apprenticeship would include a three-year course at a training centre of not less than 40 weeks' duration in each year.

In France all industries pay a *taxe d'apprentissage* amounting to 0.4 per cent. of their wages bill, irrespective of whether the firm engages apprentices or not, and one-third of all apprentices in France are trained outside industry in special centres.

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## Engineering Institutions Get Together

SPEAKING at the annual dinner of the Institution of Mechanical Engineers, the president, Prof. Owen A. Saunders, commended the co-operation between the IME and its sister institutions— those of civil and of electrical engineers—in several activities. The council of the Institution of Mechanical Engineers was convinced that this collaboration could be profitably developed, while retaining the independence of the three institutions, he said. For one thing, there was a great need for a common examination structure which would enable a young man to qualify academically for membership of any, or all, of the three institutions.

Prof. Saunders felt strongly that it was unreasonable and wrong to expect a young man in his teens to make up his mind which branch of engineering he was going to pursue for the succeeding 40 years of his life.

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## *Imperial College Realizes Expansion Plan*

PLANS made in 1953 for doubling the size of the Imperial College of Science and Technology are now becoming a reality. At the annual commemoration day ceremony in London yesterday (Thursday), Sir Patrick Linstead, the Rector, said that the total number of full-time students was now 2,700. The post graduate school had doubled in the past eight years and now numbered 1,000 students. This session, for the first time, the number of freshmen had exceeded 1,000.

This year had seen the opening of the new mechanical engineering block and the physics building and four major projects were now under way. These were new buildings for civil engineering and mechanical engineering, the second part of the mechanical engineering complex, and the residential and social development.

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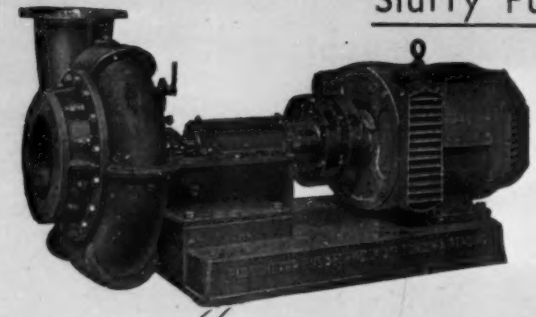
Centrifugal
Pumps

Pulsometer

Slurry Pumps



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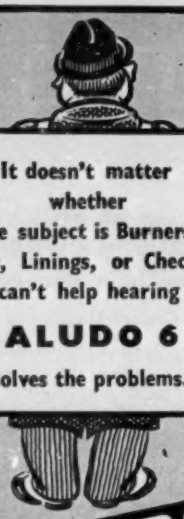

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# Law Cases

## DEPUTY FINED FOR CONTRABAND

FORMER deputy at Binley Colliery (Warwickshire), David Agnew, was fined £20 by Rugby Magistrates for taking cigarettes and matches underground. Agnew pleaded Not Guilty.

At the hearing, which opened on September 27, it was stated by the prosecution that overmen at the colliery found a carton containing three cigarettes and a matchbox, stuffed with paper to prevent "tell-tale rattle," underneath a transformer. The writing on the paper in the matchbox was identified as that of Agnew. The paper fitted in his notebook from which it had been torn out.

Giving evidence Agnew said he did not put the paper in the matchbox nor did he know anything about the cigarettes and matches. Deputies were in the habit of tearing bits of paper out of their notebooks—he had often done so. There were always scraps of paper about the mine.

After retiring the magistrates decided to convict. For the defendant, Mr. P. J. Appleby said that Agnew had been in the mine for 20 years and had been a deputy for about six years. His dismissal had been substantial punishment as far as his livelihood and career were concerned.

## £2,355 DAMAGES FOR STIFF LEG

DAMAGES of £2,355 were awarded by Mr. Justice Lloyd-Jones at Birmingham Assizes to Mr. Wilfred John Davies for injuries received at the Aldridge factory of McKechnie Bros., Limited, workers in non-ferrous metals, of Birmingham.

Mr. Davies suffered a permanent stiffening of his right leg after a load of metal parts had fallen on to him from a truck. Giving judgment, Mr. Justice Lloyd-Jones said that the company had thought so highly of Mr. Davies that it had given him back his old job as a metal inspector. He could, however, have difficulty in finding alternative employment and had lost many social amenities.

## BRENTFORD CLAIM DISMISSED

CLAIM for £400 damages for personal injury brought by Mr. Joseph Stevens (60), against Automotive Engineering Company, Limited, Twickenham (Middx), was dismissed by Judge Sir Shirley Worthington-Evans at Brentford County Court. Mr. Stevens alleged that failure to provide a handrail led to an accident in which he strained a muscle and injured his spine.

For the company, Mr. Colin Fawcett, submitted there was no negligence, even though a handrail was installed immediately after the accident. The judge found there had been no negligence and gave judgment for the company.

## NCB CLERK SENT FOR TRIAL

AFTER a three-day hearing a former National Coal Board clerk, Bertram Wilson Varley Clifton, was sent for trial at Nottinghamshire Quarter Sessions. He was granted bail and legal aid. The 13 charges of alleged falsification of accounts and five of stealing from the NCB sums totalling £125 5s. were heard by Worksop magistrates.

Prosecuting, Mr. C. W. A'Bear said that Clifton, who is 39, was formerly employed at the No. 1 Group wage office at Shireoaks, Worksop, where wages for Dinnington, Firbeck, Kiveton Park, and Manton collieries were dealt with. Mr. A'Bear alleged that Clifton had adopted a system to defraud the NCB, particularly in respect of wage payments to Dinnington Colliery miners. In a statement, Clifton was said to have admitted: "So far as I can remember I started adjusting payrolls to my advantage towards the end of 1955."

## INITIATING APPRENTICES

APPRENTICES starting work in Mauchline Colliery (Ayrshire), are put through a ceremony of initiation by their mates, said the fiscal at Kilmarnock Sheriff Court when David Kane (18) and a 15-year-old boy, both pithead workers, admitted contravening the Mines & Quarries Act, 1954, by a display of disorderly conduct in the screening plant at the colliery. Kane and his companion were said to have overpowered three workmates, thrown them to the ground and, after taking some of their clothes off, put grease on their bodies. The ceremony seemed to be one of initiation.

Speaking for himself and his mate, Kane said there had been no danger to anyone. There was no conveyor belt near where the ceremony took place. Asked to explain the greasing part of the ceremony, Kane replied: "We didn't do anything that hadn't been done to us." Both lads were fined £5, the Sheriff commenting: "I do not know what tradition this ceremony of initiation springs from, but the plain fact is that horse-play of this kind might well have meant grave danger to the victims."

## ADMISSION OF £586 THEFT

THEFT of 10 tons of blackplate sheets worth £586 from the Trostre steelworks of the Steel Company of Wales, Limited, was admitted by Arthur David Newcombe (44) at Llanelly Magistrates' Court. He was committed in custody to Carmarthenshire Quarter Sessions.

Mr. Lionel Benjamin, for the prosecution, said that Newcombe, who was employed as a lorry driver by a firm of haulage contractors, left the Trostre works with the plates destined for Llanelly. The load did not arrive and Newcombe's employers found the empty lorry outside his home the following day. He was arrested on a charge of stealing the blackplate, but until a few minutes before the court sat he maintained that the lorry had been empty when it left Trostre. Newcombe told the magistrates that he was acting "under supervision" from someone else.

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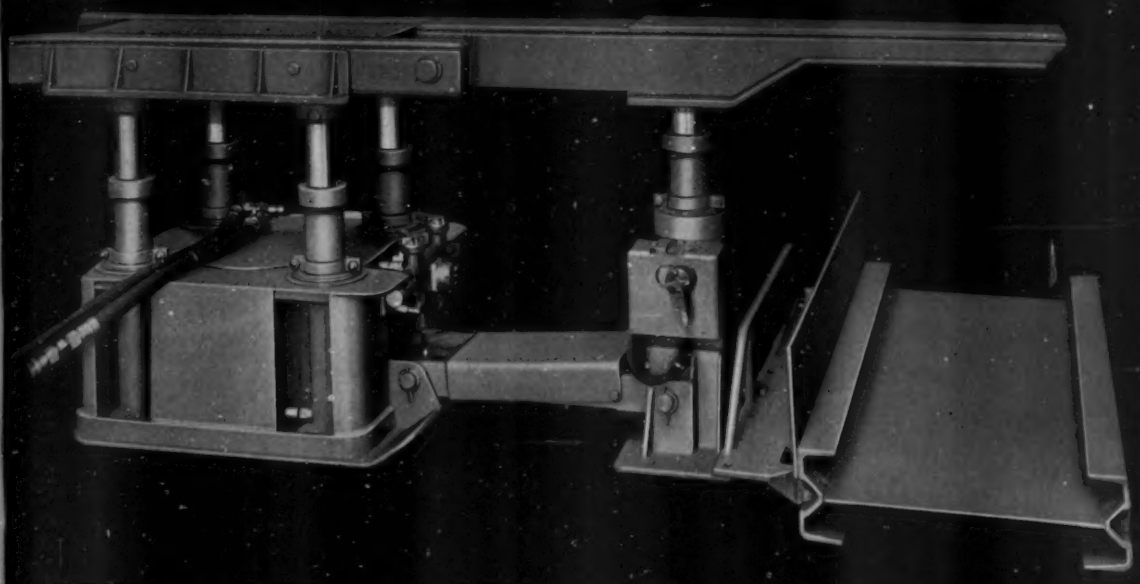
LORRY DRIVER, Ronald Maring (25), and his mate, Leslie Jones (28), were each fined £10 at Chesterfield County Magistrates' Court for stealing 4 cwt. of coal valued at 16s. The coal was part of a delivery of concessionary coal to miners. Both men pleaded Guilty.

CASE at Neath County Magistrates Court in which a miner was summoned for taking matches below ground in a safety-lamp area of the colliery, was adjourned for seven days because neither the defendant nor a representative of the NCB was present. The chairman, Ald. D. T. Jenkins, said that it would do the Coal Board good if it knew what the magistrates thought about the matter. "And they should also be told," he said, "that in future they must show courtesy to the Bench."

AFTER pleading Guilty at Neath Borough Magistrates' Court to a joint charge of stealing, with another man, 1,034 corrugated galvanized sheets, worth £519 3s. 6d. from the Neath Steel Sheet & Galvanizing Company, Limited, Peter Anthony Mowe (25) was sent to the Appeals Committee of Glamorgan Quarter Sessions for sentence. It was stated that Mowe and the other man picked up the load of sheets from the company after claiming to be employees of a transport company.



# THE GULLICK-SEAMAN

# 5 LEGGED HYDRAULIC CHOCK

Strong waste edge support is retained and so good roof control attained; also the valuable safety feature of two rows of support between the operator and the waste edge is retained.

Support close to the conveyor is provided while good bar design ensures a preload to the roof and from the canopy over the conveyor track.

As flexible as 4-legged chocks suitable for seam ranges from 2ft. 10in. to 6ft. 0in.

Will work on gradients—special arrangements have been designed for very steep workings.

**. . . considerably increases the scope of power advanced supports**

**GULLICK LTD**

**KIRKLESS STREET · WIGAN**

***Telephone: WIGAN 46225 (3 lines)***

# Exports of British Coal

DETAILS of British coal exports and bunker coal shipments in September, and the totals for the first nine months of this year and last, are given below.

| From | Month ended Sept. 30. | Nine months ended September 30. | |
|---|---|---|---|
| | 1960. | 1959. | 1960. |
| *Categories.* | Tons. | Tons. | Tons. |
| Anthracite— | | | |
| Large | 6,658 | 63,462 | 57,756 |
| Graded | 31,493 | 176,419 | 196,637 |
| Cleaned smalls | 11,900 | 70,881 | 153,856 |
| All other | 25,889 | 254,053 | 226,378 |
| Small coal (including household)— | | | |
| Unscreened | 2,704 | 22,547 | 15,156 |
| Large | 43,325 | 142,774 | 424,043 |
| Graded | 51,542 | 182,562 | 319,194 |
| Cleaned smalls | 163,705 | 267,150 | 943,449 |
| Untreated smalls | 67,450 | 599,025 | 766,925 |
| Other | 15,171 | 169,783 | 119,252 |
| Gas coal— | | | |
| Unscreened | 5,413 | 99,582 | 143,370 |
| Large | — | 1,966 | 14,415 |
| Graded | 20,410 | 199,283 | 289,735 |
| All other | 2,611 | 18,272 | 19,876 |
| Coking coal— | | | |
| Cleaned smalls | 5,976 | 25,937 | 34,671 |
| Other | 20,214 | 89,826 | 92,133 |
| TOTAL | 474,461 | 2,383,522 | 3,816,846 |
| *Destinations.* | | | |
| Canada | 14,406 | 61,768 | 53,731 |
| Other Commonwealth countries | 23 | 9,102 | 19,347 |
| Eire | 81,779 | 532,774 | 841,924 |
| Finland | 16,259 | 12,128 | 60,422 |
| Sweden | 33,307 | 117,719 | 158,431 |
| Norway | 11,470 | 64,714 | 91,726 |
| Denmark | 153,662 | 694,085 | 1,181,347 |
| Western Germany | 25,475 | 153,280 | 300,955 |
| Netherlands | 90,402 | 244,352 | 627,161 |
| Belgium | 14,076 | 226,455 | 137,437 |
| France | 10,971 | 163,598 | 123,462 |
| Portugal | 5,615 | 18,991 | 97,638 |
| Italy | 14,297 | 51,565 | 92,357 |
| Argentina | — | 15,737 | ? |
| Other foreign countries | 2,719 | 17,254 | 30,901 |
| Fuel taken on board vessels engaged in the foreign trade (including fishing vessels) for their own use)— | | | |
| British flag | 12,566 | 445,950 | 240,312 |
| Other flags | 2,446 | 37,597 | 30,911 |

# *Exports of Coke and Patent Fuel*

THE following table gives figures of exports of coke and manufactured fuel from the United Kingdom during September, and the totals for the first nine months of this year and last.

| Products. | Month ended Sept. 30. | Nine months ended September 30. | |
|---|---|---|---|
| | 1960. | 1959. | 1960. |
| | Tons. | Tons. | Tons. |
| Gas coke | 67,505 | 437,982 | 498,321 |
| Hard coke | 50,527 | 221,220 | 356,086 |
| Breeze | 39,241 | 322,830 | 313,970 |
| Manufactured fuel | 7,544 | 94,129 | 77,633 |
| TOTAL | 164,817 | 1,076,161 | 1,246,010 |

# *Imports and Exports of Mining Machinery*

ACCORDING to Board of Trade returns, mining machinery (other than portable power tools) valued at £113,590 was imported during September, compared with £87,789 in September, 1959. Imports in the first nine months of this year were valued at £855,115 against £1,105,558 in the corresponding period of last year.

The appended table contains figures of export values of mining and well-drilling machinery in September, and values for the first nine months of this year and last.

| Destination. | Month ended Sept. 30. | Nine months ended September 30. | |
|---|---|---|---|
| | 1960. | 1959. | 1960. |
| | £ | £ | £ |
| Union of South Africa | 17,025 | 396,260 | 356,628 |
| Rhodesia and Nyasaland | 4,939 | 110,142 | 60,847 |
| India | 66,786 | 1,075,330 | 873,373 |
| Australia | 19,525 | 199,792 | 292,823 |
| Canada | 4,129 | 182,986 | 226,585 |
| Trinidad | 16,400 | 269,136 | 276,319 |
| Other Commonwealth countries and Eire | 90,151 | 1,035,679 | 872,982 |
| Netherlands | 6,359 | 163,232 | 129,931 |
| France | 27,054 | 96,511 | 136,376 |
| Venezuela | 17,348 | 162,295 | 93,683 |
| Other foreign countries | 255,630 | 3,277,133 | 2,250,180 |
| TOTALS | | | |
| Well-drilling machinery— | | | |
| Petroleum | 173,136 | 3,542,008 | 1,989,332 |
| Other | 34,638 | 241,664 | 412,170 |
| Mining machinery (excluding portable power tools)— | | | |
| Coal-cutters, power operated— | | | |
| Complete | 48,507 | 385,181 | 396,600 |
| Parts | 45,087 | 453,461 | 586,154 |
| Conveyors, underground— | | | |
| Complete and parts | 55,220 | 797,853 | 789,591 |
| Winders, power operated— | | | |
| Complete | — | 92,857 | 114,691 |
| Parts | 32,712 | 195,432 | 171,872 |
| All other | 136,046 | 1,260,040 | 1,109,317 |
| TOTAL | 525,346 | 6,968,496 | 5,569,727 |

# Man-less Coal face Aim of Engineers

THE completely man-less coal face had long attracted the mining engineer and was an objective of mechanical and electrical engineers, Mr. B. L. Metcalf, director of engineering, headquarters of the National Coal Board, said last Friday. He was addressing a joint meeting of the South-east Yorkshire, North-west Yorkshire, and Midland branches of the Association of Mining Electrical and Mechanical Engineers.

In the application of the mechanical and electrical sciences to mining there was no limit to the variety of techniques, many of which were already in use, covering the whole range from light-current electrical engineering to large and formidable machines, he said. The association had a great part to play in guiding the education and training of men in charge of machines and in stimulating their scientific and technical skill.

VILLIERS ENGINEERING COMPANY, LIMITED—Group net profit for the year ended July 31, 1960, was £278,461 (£391,772), after tax of £238,320 (£370,932),

# Here is one Oil Burner that brings efficiency SIMPLY to hand

The outcome of 80 years' experience the Wallsend Self-Proportioning Low Air Pressure Oil Burner brings new ease and efficiency of control to oil burning. The single lever at the side automatically proportions oil and air quantities in the correct ratio and whatever the type of fuel.
It has, too, a turn down range of approximately 5 : 1 which can be achieved with a stable flame, efficient combustion and a high $CO_2$ content. Made with the well known Wallsend features of robustness, long service with little maintenance, and flexibility this outstanding burner leads the way, as well, to automatic or remote control of all single and multi-burner installations . . .

The Burner shown has a maximum output of 12 gallons per hour and requires atomising air at 20" (51 cm) w.g. to 30" (76 cm) w.g. with oil at not less than 5 lbs per sq. in. (0.35 kgs per sq. cm) or equivalent head.

**THE WALLSEND SELF-PROPORTIONING LOW AIR PRESSURE BURNER**

## For more efficient OIL BURNING consult

**THE WALLSEND SLIPWAY & ENGINEERING COMPANY LIMITED**

WALLSEND-ON-TYNE

In association with **HUBBARD COMBUSTION LIMITED** Kingston on Thames

# Imports and Exports of Iron and Steel

FIGURES of imports and exports of iron and steel in September are given in the following tables, based on the Board of Trade returns, and including totals for the first nine months of 1959 and 1960.

## Total Exports of Iron and Steel

| Destination. | Month ended Sept. 30. | Nine months ended September 30. | |
|---|---|---|---|
| | 1960. | 1959. | 1960. |
| | Tons. | Tons. | Tons. |
| Cyprus | 289 | 1,243 | 1,345 |
| Sierra Leone | 1,219 | 7,917 | 4,731 |
| Ghana | 2,000 | 21,034 | 16,650 |
| Nigeria | 5,151 | 54,895 | 45,705 |
| Union of South Africa | 2,251 | 30,526 | 51,019 |
| Rhodesia and Nyasaland | 1,650 | 15,454 | 19,894 |
| Tanganyika | 1,530 | 15,241 | 11,213 |
| Kenya | 2,753 | 17,515 | 22,780 |
| Uganda | 152 | 3,268 | 1,050 |
| Mauritius | 1,052 | 1,088 | 4,012 |
| Aden | 443 | 2,205 | 2,076 |
| Bahrein, Qatar, and Trucial States | 1,221 | 5,984 | 11,026 |
| Kuwait | 167 | 7,944 | 5,041 |
| India | 16,161 | 138,483 | 200,679 |
| Pakistan | 4,063 | 30,605 | 51,816 |
| Singapore | 1,753 | 17,222 | 14,720 |
| Malaya | 1,463 | 7,868 | 14,160 |
| Ceylon | 1,581 | 31,347 | 39,445 |
| British North Borneo | 74 | 1,870 | 3,366 |
| Hongkong | 5,634 | 49,265 | 63,876 |
| Australia | 17,788 | 59,866 | 135,122 |
| New Zealand | 14,513 | 71,760 | 89,621 |
| Canada | 9,890 | 148,530 | 165,716 |
| Jamaica | 2,525 | 15,970 | 17,970 |
| Trinidad | 2,522 | 30,926 | 30,682 |
| British Guiana | 667 | 5,140 | 6,886 |
| Other Commonwealth countries | 2,224 | 26,942 | 27,008 |
| Eire | 5,719 | 35,401 | 46,285 |
| Soviet Union | 239 | 20,708 | 23,156 |
| Finland | 1,666 | 26,329 | 34,209 |
| Sweden | 13,163 | 89,170 | 130,541 |
| Norway | 7,573 | 68,679 | 84,219 |
| Denmark | 6,125 | 68,879 | 72,069 |
| Western Germany | 9,686 | 99,592 | 107,079 |
| Netherlands | 7,832 | 71,209 | 90,784 |
| Belgium | 1,610 | 27,973 | 25,843 |
| France | 729 | 2,532 | 5,688 |
| Switzerland | 1,444 | 6,657 | 10,284 |
| Portugal | 1,769 | 11,610 | 12,292 |
| Spain | 1,832 | 21,454 | 37,574 |
| Italy | 3,304 | 37,877 | 32,076 |
| Austria | 646 | 2,645 | 4,007 |
| Yugoslavia | 737 | 2,614 | 29,076 |
| Greece | 1,289 | 8,238 | 13,855 |
| Turkey | 1,919 | 4,469 | 11,576 |
| Netherlands Antilles | 87 | 1,992 | 2,781 |
| Portuguese East Africa | 330 | 1,176 | 3,536 |
| Egypt | 359 | 2,150 | 9,929 |
| Sudan | 569 | 5,721 | 7,256 |
| Lebanon | 826 | 2,369 | 1,687 |
| Israel | 1,224 | 11,299 | 15,155 |
| Saudi Arabia | 24 | 2,866 | 369 |
| Iraq | 4,486 | 58,070 | 32,560 |
| Iran | 2,193 | 23,246 | 48,876 |
| Burma | 205 | 6,646 | 4,801 |
| Thailand | 1,173 | 6,295 | 4,968 |
| Indonesia | 1,760 | 4,053 | 19,950 |
| China | 2,575 | 32,419 | 40,032 |
| Japan | 4,761 | 105,377 | 54,459 |
| Philippine Republic | 189 | 6,149 | 6,050 |
| USA | 8,405 | 133,846 | 163,978 |
| Cuba | 65 | 5,236 | 5,905 |
| Colombia | 440 | 2,773 | 6,591 |
| Venezuela | 1,975 | 54,293 | 28,438 |
| Ecuador | 74 | 811 | 2,128 |
| Peru | 402 | 1,994 | 4,928 |
| Chile | 136 | 1,069 | 3,280 |
| Brazil | 1,009 | 18,162 | 22,838 |
| Uruguay | 646 | 771 | 6,677 |
| Argentina | 5,753 | 161,918 | 65,089 |
| Other foreign countries | 18,293 | 58,092 | 106,449 |
| TOTAL | 225,977 | 2,125,937 | 2,496,912 |

## Total Imports of Iron and Steel

| From | Month ended Sept. 30. | Nine months ended September 30. | |
|---|---|---|---|
| | 1960. | 1959. | 1960. |
| | Tons. | Tons. | Tons. |
| Union of South Africa | 1,015 | 18,239 | 23,969 |
| Rhodesia and Nyasaland | 268 | 4,056 | 5,123 |
| Canada | 50,035 | 13,309 | 197,875 |
| Other Commonwealth countries and Eire | 7,349 | 8,576 | 37,958 |
| Soviet Union | 1,150 | 41,787 | 27,590 |
| Sweden | 3,481 | 21,336 | 35,223 |
| Norway | 13,406 | 62,169 | 119,464 |
| Poland | 109 | 3,723 | 8,370 |
| Western Germany | 7,775 | 53,828 | 108,907 |
| Netherlands | 12,832 | 122,462 | 153,342 |
| Belgium | 9,138 | 16,871 | 91,663 |
| Luxembourg | 799 | 4,913 | 11,763 |
| France | 2,867 | 16,387 | 52,510 |
| Italy | 84 | 10,973 | 21,081 |
| Austria | 339 | 3,157 | 9,637 |
| Japan | 822 | 1,958 | 5,317 |
| U.S.A. | 18,857 | 19,551 | 314,733 |
| Other foreign countries | 31,214 | 9,345 | 122,155 |
| TOTAL | 161,540 | 432,640 | 1,346,680 |
| Iron and steel scrap and waste, fit only for the recovery of metal | 40,541 | 2,509 | 195,273 |

## Exports of Iron and Steel by Product

| Product. | Month ended Sept. 30. | Nine months ended September 30. | |
|---|---|---|---|
| | 1960. | 1959. | 1960. |
| | Tons. | Tons. | Tons. |
| Pig-iron | 9,340 | 104,905 | 121,095 |
| Ferro-columbium (niobium) | 7 | 39 | 85 |
| Ferro-tungsten | 105 | 869 | 743 |
| Other ferro-alloys | 1,815 | 6,008 | 8,222 |
| Ingots, blooms, billets, slabs, sheet bars (incl. tinplate bars), and similar primary forms | 418 | 60,087 | 21,685 |
| Pieces roughly shaped by forging | 99 | 1,176 | 775 |
| Iron bars, rods, angles, shapes, and sections | 104 | 1,581 | 1,283 |
| Steel bars, rods, angles, sections, and shapes | 39,878 | 320,964 | 463,537 |
| Iron plates and sheets | — | 287 | 527 |
| Universal plates | 1,502 | 7,379 | 14,877 |
| Steel plate, 3 mm. and under 4.5 mm. thickness | 2,672 | 30,159 | 30,755 |
| Ditto, 4.5 mm. or more in thickness | 23,847 | 142,936 | 256,301 |
| Blacksheets and blackplate | 21,990 | 199,507 | 221,801 |
| Hoop and strip | 8,500 | 61,718 | 76,419 |
| Tinplate | 32,549 | 349,746 | 378,786 |
| Decorated tinplate | 610 | 6,493 | 4,515 |
| Galvanized sheets | 7,343 | 65,004 | 62,356 |
| Other (incl. tinned sheets, terneplate, and ternesheets) | 2,147 | 16,179 | 19,949 |
| Railway and tramway construction material | 7,726 | 116,086 | 123,250 |
| Wire rods of steel (incl. alloy steel) | 4,402 | 35,957 | 41,952 |
| Wire | 8,102 | 78,469 | 88,497 |
| Tubes, pipes and fittings | 52,821 | 520,388 | 559,502 |
| TOTAL | 225,977 | 2,125,937 | 2,496,912 |

IN CONSEQUENCE of the planned reorganization which has taken place over the last year, the headquarters of the Birfield, Limited, group will be located at 20, Hill Street, London, W.1, from November 7. The telegraphic address becomes Beltistos, Audley, London, but the telephone number remains unchanged. Also on November 7 the group's automotive division is moving its headquarters to Birmingham and the railway division's headquarters are transferring to Sheffield.